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A handwritten signature in black ink, reading "Karrie J. Craig". The signature is written in a cursive, flowing style with a large, stylized 'K' and 'C'.

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## Abstract

Title of Thesis: Intrusive thought and reactivity  
associated with task performance

Karrie J. Craig, Doctor of Philosophy, 1995

Thesis directed by: Andrew Baum, Ph.D., Research Professor,  
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This dissertation research examined the occurrence of intrusive thoughts and reactivity during task performance. Intrusive thoughts were investigated in both the state and trait format and reactivity included changes in heart rate and systolic and diastolic blood pressures during the task.

Sixty subjects, 30 female and 30 male, were randomly assigned to two groups. One group received printed instructions for the completion of an anagram task. The other group received these same instructions and additional instructions indicating that the task was related to intelligence and should be successfully completed by most college students of average intelligence. Subjects then completed the anagram task, during which heart rate and blood pressure readings measurements were taken. Baseline and post-task heart rate and blood pressure measures were also taken to



allow examination of reactivity during the task. After completing the task, subjects completed a battery of questionnaires that measured mood, intrusive thoughts (state and trait), psychological and physical symptoms, and life events.

Analyses revealed that the conditions under which the task was performed (instruction-only vs. performance-instruction) had no reliable effects on task performance or reactivity. The trait measure of intrusive thought was related to the level of "task-related interference" reported during the task (state measure), however neither of these measures were related to reactivity or task performance.

INTRUSIVE THOUGHTS AND REACTIVITY ASSOCIATED WITH  
TASK PERFORMANCE

by

Karrie J. Craig

Thesis submitted to the faculty of the Department of Medical  
and Clinical Psychology of the Uniformed Services University  
of the Health Sciences in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy, 1995



## DEDICATION

This dissertation is dedicated to my husband, Andrew, my parents, Gene and Carole Knutson, and my sisters, Kimberlee and Krista Knutson, who provided a great deal of humor and unwavering love and support throughout my graduate career. A special thank you to my parents for instilling in me the belief that an education is always worth pursuing and that knowledge makes you stronger. And, to Andrew -- thank you for your patience and understanding, but most of all, for believing in me.

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## INTRODUCTION

Traumatic life events are often followed by intrusive thoughts about these events or their aftermath (Goodhart, 1985; Ingram, 1984; Sarason, Potter, & Sarason, 1986). Defined as repetitive thoughts, images, or impulses that are unacceptable and/or unwanted, intrusive thoughts have been linked with subjective and psychophysiological disturbances and may be triggered by both internal and external sources (Horowitz, 1970; Rachman, 1981). In this dissertation, I will first review relevant theories of intrusive thoughts and their relationship to reactivity and stress. In doing so, I will consider the pervasiveness of intrusive thought as well as theories that have been developed regarding their origin and function. This discussion will include findings related to each theory and its association with stress and reactivity and the contributions of each theory and the problems associated with each. Finally, a study to test the relationships among intrusive thoughts, reactivity, and task performance will be described and the results of this study reviewed and interpreted.

Intrusive thoughts have been examined in conjunction with



a number of events from everyday happenings to traumatic experiences, and have been associated with increased distress in studies of individuals who were physically disabled following a traffic accident (Silver, Wortman, & Klos, 1982), women who were incest victims (Silver, Boon, & Stones, 1983), and young women following hysterectomy (Vincent, Vincent, Griess et al, 1975; Kaltreider, Wallace, & Horowitz, 1979). Intrusions have been shown to be related to the experience of a disaster (Horowitz, 1985), and to the unexpected death of a spouse or child in a motor vehicle crash (Lehman, Wortman, & Williams, 1987). Students who are high in test anxiety experience intrusive thoughts when faced with a test or performance in a stressful situation (Sarason, 1984) and intrusions are also related to poor task performance among those individuals who generally experience intrusions (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986).

Recent data also suggest that intrusive thoughts may play a role in sustaining chronic stress following acute stressors. The frequency of intrusive thought has been found to predict chronic stress responses in a number of populations including Three Mile Island area residents and Vietnam combat veterans (Baum, Cohen, & Hall, 1993; Davidson & Baum, 1986; 1993).

These studies indicate that intrusive thought may be among the more important mechanisms for understanding how stress responses can become chronic.

This presumes that intrusive thoughts about stressful events are themselves stressful, and they may be disturbing due to several factors including 1) interference with ongoing behavior that disrupts the desired thought pathway, such as may occur during concentration or task performance, 2) the sense of loss of control over mental processes, and 3) the actual content of the thoughts, particularly those of a negative or traumatic nature. Basic to the idea that intrusive thoughts are associated with distress is the degree to which they make people uncomfortable, tense, or aroused. This has not been systematically evaluated and the present study begins to investigate the relationship of arousal and intrusions in a task performance situation.

In this research, I examined intrusive thoughts and psychophysiological changes that occurred during task performance. Past research has shown that the occurrence of intrusive thought during task performance is associated with poorer performance on the task (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). The mechanisms that cause this

decreased performance are not known. The present study was designed to provide information about the psychophysiological changes associated with intrusive thoughts during task performance in order to examine the possibility that reactivity influences task performance. Information about the individual's general tendency to experience intrusions as well as the amount and type of intrusions experienced during a performance task was collected. Associations between tendency to experience intrusions and intrusions experienced during the task were expected to predict reactivity during the task. Depending on factors such as how common intrusive thoughts are in the general population, this intrusion-related reactivity could be an important determinant of performance during a stressful task.

#### Are intrusions normal?

Rachman and his colleagues were among the first to investigate intrusive thought. Rachman's (1980) theory of emotional processing has been used to explain why people experience intrusions. Emotional processing involves disturbing emotional events that must be integrated and

absorbed in order to allow the progression of other experiences and behaviors. Emotional processing is comprised of three stages, (1) the occurrence of an event that is emotionally disturbing, such as a traumatic stressor, (2) the decline of that disturbance, and (3) a return to normal, routine behavior. When the first condition is met but stages 2 and 3 are not completed, emotional processing is said to have failed. When the process fails and an emotional event is not absorbed satisfactorily, symptoms such as intrusive thoughts, nightmares, concentration difficulties, and irritability are likely to occur.

Rachman began his work on intrusions by examining the obsessions of obsessive-compulsive patients (Rachman, 1971). Rachman believed that all of us experience distasteful and unacceptable thoughts from time to time, but for most of us, these thoughts are of minimal consequence. Some people, (in his early work, obsessional patients), experience them repeatedly and are greatly disturbed by these thoughts. Although most intrusions are absorbed by the individual experiencing them, mood disturbance (eg. depression, anxiety) may inhibit absorption and this may cause problems. Rachman also regarded intrusive thoughts as noxious and largely



endogenous stimuli to which the individual has failed to habituate. This view was later updated and Rachman argued that intrusions were provoked by external events and triggers as well as by internal cues (Rachman, 1981).

Several studies have provided support for this model. Rachman and de Silva (1978) investigated "normal" and "abnormal" intrusions, examining the intrusions of 124 non-clinical subjects. Their first study asked about the presence of intrusive, unacceptable thoughts and impulses, their frequency, and their ease of dismissal. Ninety-nine (80%) of the non-clinical subjects reported that they experienced either intrusive thoughts or impulses, confirming the hypothesis that non-psychiatric individuals commonly experienced intrusions. There were no age or gender differences in the reporting of intrusive experiences. Salkovskis and Harrison (1984) used an adaptation of Rachman and de Silva's 1978 questionnaire in a sample of 178 undergraduates, and found that 88.2% reported intrusive thoughts and impulses. In each of these studies, the majority of non-clinical subjects reported experiencing intrusions on a fairly frequent basis, lending additional support to Rachman's hypothesis of the normalcy of intrusions.

These data are interesting and helpful in developing a basic theory of intrusive thoughts because they provide information that was missing regarding the commonality and content of intrusive thought. Rachman and de Silva (1978) found that (1) intrusions are a common experience with no age or gender-related differences, and (2) the form and content of intrusions is similar for obsessional patients and non-clinical individuals. Once the pervasiveness of intrusive thought was established it became important to understand why these thoughts occur. The finding that most abnormal intrusions are of known onset such as an association with a stressful event (e.g. death of a relative or friend, moving; Rachman & de Silva, 1978), led to the investigation of the relationship between a stressful event and the formation of intrusions. Rachman (1971) suggested that the relationship between stress and intrusive thought is one in which the intrusions arise during or soon after a period of stress during which the person experiences depression and agitation.

Parkinson and Rachman (1981b) reported a study of the behavior and reactions of 25 mothers whose children were being admitted to a hospital to undergo tonsillectomies and 25

mothers whose age-matched children were not undergoing surgery. All 50 mothers completed an interview and three experimental tasks; an arithmetic performance task while listening to auditory presentations of stimulus words, an auditory recognition task designed as a direct test of the intrusiveness of stress-related stimuli, and an indirect test of intrusive activity using the Pope-Singer (1978) "stimulus independent mentation method" involving verbal reports of intrusions being experienced.

The results of the interview indicated that the surgery group mothers had less satisfactory sleep the night before their child's admission and they also reported greater anxiety and depression than did the comparison group. The surgery group mothers also reported significantly more intrusive thoughts and images on the day prior to the admission of their child. On the digit performance task, the surgery mothers made three times more errors than did the control mothers. The surgery mothers reported more intrusiveness of stimuli during the auditory recognition task and on the Pope-Singer task they reported five times as many stress-related intrusive thoughts and four times as many child-relevant intrusive thoughts. In summary, the anticipatory surgery mothers

underwent a stressful event and displayed mood disturbances, poor task performance, an increased number of intrusive cognitions, and an increase in the intrusiveness of stressful material.

A follow-up study (Parkinson & Rachman, 1981c) investigated the ability of the mothers in the surgery group to absorb the event and complete the emotional processing. As in the first study, these mothers exhibited anxiety and depression, made a large number of cognitive errors, had difficulty concentrating, and reported a large number of stress-related intrusive cognitions on the day of the child's surgery. Within 24 hours of the child's operation, all of the indicators of stress and intrusions had disappeared and the surgery mothers' reports and performance were indistinguishable from the comparison mothers. These data suggested that the mothers were able to satisfactorily complete the emotional processing of the stressful event concerning their child's surgery within a relatively short period of time.

This series of studies provides valuable information regarding intrusive thoughts surrounding a stressful event and the time frame in which these intrusions are overcome. It was

reported that an individual was able to successfully process an acute stressor within a 24-hour period. These studies also introduced three techniques for the behavioral measurement of intrusive thought.

#### Intrusive thoughts and stress -- Horowitz' paradigm

Another group of researchers that extensively studied intrusive thought and its relationship to stress is Horowitz' (Horowitz, 1969; 1970; 1975; Horowitz & Becker, 1971; 1973; Horowitz, Becker, Moskowitz, & Rashid, 1972). They began examining intrusive thoughts in order to better understand the processes that occur following exposure to a stressful event. The model that they created focused on the idea that when an event is experienced, cognitive processes work to integrate the new experience with previous information. When the event is a stressful one, the synthesis of new and old experiences can become difficult because the new event may not fit in with the existing structures if it is markedly different from anything encountered previously (Horowitz & Reidbord, 1992). Horowitz postulated that as we struggle to attain completion and resolution of new experiences, the memory of the stressful



event may be held in a form of active memory, which has an intrinsic property of repeated presentation, to allow for processing and reworking of the event as a long-term memory. These memories can take the form of intrusive thoughts and may cause distress for the individual. The longer the process of adaptation takes, the longer these thoughts may be experienced.

Horowitz et al (1980) discussed the cycling of intrusive and avoidant behaviors and suggested that the avoidant thoughts and behaviors are attempts to control the occurrence of intrusive thoughts. The alternation between periods of intrusive thought and denial allows the individual to gradually tolerate increasing doses of the distressing components of the event. With each repetition of the intrusive thought, the process of integration is carried forward and this pattern continues until the synthesis is complete. The active repetition of the ideas and emotions associated with the stressful event is terminated as the event becomes part of both long-term memory and expectancy schemata (Horowitz, 1985, 1986; Horowitz, Wilner, Kaltreider, & Alvarez, 1980).

The relationship of stress and intrusive thoughts was

examined by Horowitz and his colleagues using a model developed specifically to measure intrusions following stressful events. Horowitz (1975) described the intrusions following a stressful event as being part of a general stress response tendency. Over the course of many years, they substantiated their hypothesis that intrusive thought is a general stress response exhibited by a majority of persons following exposure to a stressor. Their research supported this hypothesis even though the film stressor that they used provoked only a mild to moderate stress response.

Horowitz, Wilner, & Alvarez (1979) created a paper and pencil measure of intrusive and avoidant thoughts and behaviors, the Impact of Event Scale (IES). The Impact of Event Scale can be used with any event, therefore it can be used to compare reactions to various events, to compare reactions to an event over time, or to examine differences in response to the same event. For example, Horowitz et al. (1980) conducted a study investigating stress responses following real-life stressors of 66 outpatients at a stress clinic. Half of these participants had experienced the death of someone close to them and half sustained personal injuries including violence, accidents, and illnesses. An average of

25 weeks had elapsed between the event and assessment in this study. Participants completed the Impact of Event Scale and several other self-report measures and clinicians also provided ratings for each participant.

Results indicated that the vast majority of subjects experienced intrusive thoughts -- 76% of the sample reported thinking about "their" event when they didn't mean to and having images of it pop into their minds. The clinician ratings indicated a similar pattern with 90% of the participants rated as being preoccupied with and ruminating about the event and 77% exhibiting intrusive ideas. The participants also completed the Symptom Checklist 90-R (SCL-90-R; Derogatis, 1977) and 90% reported unwanted thoughts, words, or ideas that were difficult to dispel. This study again indicated that common signs and symptoms reported by a traumatized sample are intrusive ideas and feelings, and avoidance and numbing behaviors.

In summary, Horowitz and his colleagues elaborated on the relationship of stress and intrusions by developing a model that allowed for the examination of intrusive thoughts immediately following a stressful event. This paradigm was used with a variety of samples and each time indicated that

intrusions increase following a stressor. They also created a paper and pencil instrument that measures frequency of intrusive and avoidant thoughts and behaviors which has provided information regarding the frequency and extent of intrusive thoughts following an event. Throughout this work, Horowitz has emphasized that a cycling between intrusive and avoidant thoughts following a stressful event is normal (within limits) and necessary for the processing and acceptance of an event.

Horowitz' and Rachman's findings are consistent in showing that intrusive cognitions are accompanied by emotional distress along with a worsening of cognitive performance and a heightened sensitivity to stress-related words. Their research has contributed significantly to the understanding of the relationship between intrusive thoughts and stress. Horowitz provided a good model for examining stress reactions to a mild film stressor, but this paradigm has limited applications and is not useful outside of a laboratory setting. Some problems with Horowitz' work involve the use of stressful films because the stressors are not personally relevant and therefore probably not as upsetting as an intrusive thought following a real-life stressor. This is a

common problem in many areas using laboratory studies to investigate real world phenomenon and it is important to acknowledge the differences between laboratory and field research findings. Earlier work done by Lazarus and his colleagues found that the use of soundtracks along with the "Subincision" film produced a greater physiological stress response, indicated by heart rate and skin conductance, than when the film was shown silently such as in Horowitz' model (Lazarus, Speisman, Mordkoff, & Davison, 1962; Speisman, Lazarus, Mordkoff, & Davison, 1964). Perhaps the inclusion of sound could strengthen Horowitz' model and his findings.

The Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) however, is a useful tool for examining intrusive thoughts both inside and outside the laboratory. The Impact of Event Scale can be used with any event, therefore it can be used to compare reactions to various events, to examine reactions to an event over time, or to compare differences in individual response to the same event.

Rachman's findings regarding the normalcy of intrusions led to the expanded study of intrusive thought in non-psychiatric individuals. Rachman's study of surgery mothers provided valuable information about cessation of intrusive



thoughts and recovery from their effects following a real-life stressful event. This same study provided useful behavioral measures of intrusive thought that may be used either in a lab setting or in naturalistic field research. These behavioral measures have not been used by many other research groups however, and their reliability and validity remain to be tested in future research.

Stressful events such as those studied by Horowitz and Rachman can intensify existing intrusive activity or create new intrusions. As the intrusions become more intense they also cause increased distress and discomfort, and decreased control. The removal of a current, active stressor may lead to a reduction in intensity and frequency of intrusive activities (Parkinson & Rachman, 1981c). Both Horowitz and Rachman agree that distressing intrusive thoughts are seen as "normal" when they occur and subside within a relatively brief period of time following a disturbing event (Horowitz, 1985; Parkinson & Rachman, 1981a, 1981b, 1981c; Rachman, 1980, 1981).

Physiological changes and intrusive thoughts

The experience of stress is generally accompanied by a host of physiological changes (Cannon, 1929; Mason, 1975; Selye, 1976). The stress process involves activation of the sympathetic nervous system including the release of catecholamines which are known to cause increases in heart rate and blood pressure (Krantz, Baum, & Singer, 1983). Reactivity, an increase in heart rate and blood pressure that occurs during and following an acute stressor, has been observed in animals under prolonged or severe stress (for a review, see: Schneiderman, 1983), and in humans following stressors such as competition, threat of electric shock, harassment, and mental arithmetic tasks (Dembroski, MacDougall, Herd, & Shields, 1979; Glass et al, 1980; Krantz et al, 1983; Obrist et al, 1983). Reactivity measurements provide a useful indicator of potentially damaging pathogenic processes and may predict coronary disease better than do baseline and resting hemodynamic measures (Krantz et al, 1983).

Blood pressure reactivity to stress has been implicated

as a predictor of coronary heart disease and mortality (Keys et al., 1971; Krantz & Manuck, 1984; Manuck, Kaplan, & Clarkson, 1986). Differences between men and women have been reported in regard to reactivity such that men generally exhibit larger blood pressure increases in response to stress than women (Dembroski et al., 1985; Matthews et al., 1991; Stoney, Davis, & Matthews, 1987). Women however, tend to have greater heart rate increases in response to a challenge or stressor (Collins & Frankenhauser, 1978; Stoney et al., 1987). Research has found that gender-oriented tasks do not generally reveal differences in reactivity between men and women (Matthews et al., 1991). For the purposes of this dissertation, a stressor/task was chosen that has no history of gender differences in performance or reactivity (Arkin, Detchon, & Maruyama, 1982; Bourne, Ekstrand, & Dominowski, 1971; Mendelsohn, Griswold, & Anderson, 1966) in order to avoid any possible gender biases created by the task itself.

A measurement issue arises when reactivity data are used. This issue involves the use of raw data scores or absolute scores, versus change scores (change from baseline) as the preferred indicator of reactivity. Although both measures of reactivity are seen as acceptable there are differences

between the two and these differences should be clarified. When absolute scores are used the baseline measure is used as a covariate in the analyses. For change scores however, differences between the during stressor/task measure and the baseline reading are computed. By using the change scores, one loses information about the level at which the participant's baseline and during task measures occur. Absolute scores allow for inclusion of the level of the variable as well as the difference between baseline and task readings.

Llabre et al. (1991) examined change versus absolute scores for cardiovascular reactivity in two samples using heart rate, systolic blood pressure, and diastolic blood pressure during baseline and a behavioral challenge. Results indicated that both measurements of reactivity (change and absolute scores) yielded comparably reliable measures of heart rate and blood pressure response to challenge. Another group of researchers, Gerin et al. (1993) also found that cardiovascular reactivity change scores and absolute levels had similar reliabilities.

Several researchers have used change scores to examine cardiovascular reactivity (Contrada, 1984; Gerin, 1994; Krantz

et al., 1987; Seraganian, 1985) and do not report using absolute scores. The study presented here used both change scores and absolute scores in order to analyze the data and address this issue from both perspectives.

Despite the vast amount of research that has been conducted on stress, reactivity, and health, little is known about the relationship between intrusive thoughts and reactivity. As stated earlier, intrusive thoughts are known to occur following stressful events but it is not known whether there is a relationship between intrusions and reactivity. If reactivity is associated with intrusive thoughts, that is, if frequent intrusive thoughts cause heightened sympathetic nervous system activity, then intrusive thoughts may be a mechanism by which the physiological portion of the stress process continues after the cessation of the stressor. Intrusions may cause physiological reactivity because they are sometimes experienced as a "reliving" of the stressful event. The "reliving" of the event is often accompanied by the emotional and physiological aspects that occurred at the time of the event. If a person was mugged, for example, when they have an intrusive thought about the mugging they may experience arousal including shortness of

breath and rapid heart pounding just as they did at the time of the actual event. Even without the more dramatic sense of "reliving" an event, an intrusion that is simply a reminder of the event may also be associated with physiological responses. because it reminds people of unresolved aspects of the stressor or other aspects of the situation. Repetition of intrusive thoughts therefore implies repetition of the physiological concomitants of the experience and the repeated occurrence of this arousal may sustain chronic stress and pose health threats as well.

Davidson and Baum (1986) reported that residents of the Three Mile Island area evidenced increased heart rate and blood pressure five years after the disaster. Those individuals who reported higher levels of intrusive and avoidant thoughts and behaviors exhibited higher heart rate and blood pressure levels than did those who reported lower levels of intrusion and avoidance. This study provided evidence of a relationship between resting cardiovascular measures and intrusions following a stressful event, such as a technological disaster, that may persist up to five years. In a later paper, Baum, O'Keeffe, and Davidson (1990) discussed the possible role that intrusive thought may play in



maintaining a chronic stress response. They suggested that intrusive memories are a mechanism by which a traumatic, usually acute, event can become associated with a chronic stress response. They hypothesize that repetition of intrusive thoughts may lead the individual to "relive" the trauma such that the event may assume a "life" independent of physical reality. Davidson and Baum (1993) reported that irrespective of combat exposure, Vietnam veterans who experienced intrusive thoughts regarding Vietnam also experienced symptoms of chronic stress more than 14 years after the significant event as compared to age-matched, non-combat and non-military control subjects. Heart rate and blood pressure readings taken before and during a performance task were not different between groups as a function of intrusive thinking and combat experience. No studies are available however, that directly examine the link between the tendency to experience intrusive thoughts, reactivity, and the stress response.

There is some evidence of arousal properties of intrusive thoughts. A study by Schwartz (1971) found that the generation of affect-laden thoughts led to a greater increase in heart rate than the generation of neutral thoughts. This

finding led to investigations of the autonomic responses produced when thoughts, including intrusions, were experienced. Rabavilas and Boulougouris (1974) recorded heart rate and skin conductance from eight patients suffering from longstanding intrusions during exposure to neutral and obsessional fantasies. They found that both heart rate and maximum deflection of skin conductance were greater during obsessive imagery than during neutral images. This study was the first to confirm that intrusive thoughts could be distinguished from neutral images using autonomic measures. In an investigation of thought-stopping, Stern, Lipsedge, and Marks (1973) found no difference between the psychophysiological responses to obsessional and neutral thoughts using heart rate and skin conductance measures. However, subjectively, the intrusive thoughts were reported as producing more anxiety. Other studies mention reported changes in psychophysiological responses but these tend to be self-report measures and therefore are suspect to reporting biases (Parkinson & Rachman, 1981a).

According to Pennebaker and his colleagues, the inhibition of behaviors, thoughts, and feelings requires physiological work (Pennebaker, Hughes, & O'Heeron, 1987).

Pennebaker has found that intrusions are related to inhibition such that individuals who report using inhibition also experience more intrusive thoughts. This use of inhibition and its concomitant intrusions may contribute to the physiological strain on a person (Pennebaker & O'Heeron, 1984). Short-term inhibition has been associated with brief increases in specific autonomic activity (skin conductance, Fowles, 1980; Pennebaker & Chew, 1985) but long-term inhibition may place additional stress on the body leading to increased rates of symptoms and illnesses (Pennebaker & O'Heeron, 1984). This line of research indicates that the process of intrusive thought may be related to stress by way of the psychophysiological work of inhibiting thoughts and experiencing intrusions. Chronic recurrence of intrusive thoughts and their accompanying changes in heart rate and blood pressure may contribute to chronic stress responses that follow a stressful or traumatic event.

#### Cognitive interference and intrusions

Pennebaker's theory regarding the physiological aspects of inhibition and its concomitant intrusive thoughts and

reactivity can be viewed as complementary to the next theory I will present. It is the combination of these two theories that provides the theoretical basis for the proposed study. Sarason and his colleagues developed a theory of cognitive interference and intrusive thought (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). They suggest that intrusive thoughts divide attention and create cognitive time-sharing overloads such that people may perform poorly on complex tasks, especially under challenging conditions (Sarason, 1984). Intrusive thoughts make it difficult to focus on the task at hand. By combining these ideas with the work of Pennebaker, the proposed study will investigate the relationship of intrusive thoughts and physiological reactivity under performance conditions.

Research from several areas in psychology has suggested that performance may suffer as a result of cognitive interference or intrusive thinking such that individuals may exhibit problems concerning social behavior (Clark & Arkowitz, 1975), test-taking (Sarason, 1984), behavior during depression (Beck, 1976; Beck, Rush, Shaw, & Emery, 1979), and accidents and injuries (Coddington & Troxell, 1980; Selzer & Vinokur, 1974). The tendency to experience intrusive thoughts has been

associated with deficits in interpersonal experiences such as poor childhood relationships with parents (Yee & Pierce, 1989), lack of social support (Sarason, 1981; Sarason & Sarason, 1986b), and emphasis on negative thoughts (Sarason, Potter, & Sarason, 1989). Because intrusive thoughts tend to occur more often in situations involving performance and evaluation, there is an increase in intrusions reported at work, which can affect a person's career path and future success (Sarason, Sarason, & Pierce, 1990).

Sarason et al. hypothesized that if the tendency to have intrusive thought was a stable, trait-like condition then it may have predictive value when evaluating behavior and the tendency to experience cognitive interference. Sarason and his colleagues argued that a trait measure of intrusive thought would be helpful in examining personality styles, in clinical assessments, and in accounting for accident-proneness in certain people (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). Several other researchers have also argued for the value of assessing intrusive cognitions as a trait attribute (Broadbent, Cooper, Fitzgerald, & Parkes, 1982; Nideffer, 1976; Reason & Lucas, 1984).

To assess the thoughts that intrude while a person is

working on a task, Sarason and his colleagues developed a state measure of intrusive thought, the Cognitive Interference Questionnaire (CIQ: Sarason & Stoops, 1978). The Thought Occurrence Questionnaire (TOQ: Sarason, Sarason, Keefe, Hayes, & Shearin, 1986) was also developed in order to measure the general tendency to misappropriate attention to off-task thoughts. In one study using the Cognitive Interference Questionnaire and the Thought Occurrence Questionnaire, results indicated that individuals who reported a greater level of intrusive thinking in general (Thought Occurrence Questionnaire) also showed higher levels of intrusive thought on the Cognitive Interference Questionnaire when working on a difficult anagram task (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). Another study found that participants scoring high on the Thought Occurrence Questionnaire performed more poorly when an instructional stressor was added than did subjects reporting less tendency to experience intrusive thoughts (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986).

Cognitive interference has been related to poor task performance by several researchers (Mikulincer, Kedem, & Zilkha-Segal, 1989; Sarason & Sarason, 1987; Sarason & Stoops, 1978, and Yesavage & Jacob, 1984). According to Sarason and

Stoops (1978), cognitive interference can narrow the attentional focus on environmental cues, distort encoding, transformation, and planning strategies, and influence responses that may be selected to cope with challenges confronting the individual. Under stressful conditions, decreases in performance and an enhancement of intrusive thoughts appear to be even greater than changes that occur in non-stressful situations (Sarason & Sarason, 1987). An early version of the Thought Occurrence Questionnaire was negatively correlated with eyewitness recall such that those individuals who experienced more cognitive interference also missed more information on an eyewitness test (Siegel & Loftus, 1978). In a study of sleep loss and intrusive thought, subjects who scored high on the Thought Occurrence Questionnaire performed worse on tasks (longer reaction times) following a 72-hour sleep loss as compared with subjects who did not engage in intrusive thoughts regularly. The amount of cognitive interference increased over the 72-hour period for the high Thought Occurrence Questionnaire subjects, but not for the low Thought Occurrence Questionnaire participants (Mikulincer, Babkoff, Caspy, & Weiss, 1990).

These results support Sarason et al's hypothesis that the



tendency to experience intrusive thoughts could be a vulnerability factor in certain situations. These findings were substantiated in a series of five studies using a variety of performance tasks with almost 1500 participants (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986). Overall, it can be concluded that those people who endorsed a high number of intrusions in general (Thought Occurrence Questionnaire) performed more poorly in demanding situations (Sarason et al, 1986).

The content of intrusive thoughts also affects the severity of cognitive interference and studies have been conducted to investigate the effects of various types of cognitive interference. Situations in which a person's resources cannot satisfy a demand for action increase the frequency of off-task thoughts (Mikulincer & Nizan, 1988; Sarason, 1984). Subjects who habitually engage in off-task cognitions performed more poorly in evaluative and stressful situations than did those who habitually engaged in task-relevant thoughts (Mikulincer, 1989; Mikulincer, Babkoff, Caspy, & Weiss, 1990; Sarason et al, 1986). Mikulincer & Nizan (1988) found that off-task cognitions were increased and task performance decreased following a failure experience.

Mikulincer (1989) investigated the occurrence of cognitive interference following unsolvable problems and found that those individuals with high Thought Occurrence Questionnaire (trait) scores, specifically those reporting high escape and mind-wandering thoughts on the Thought Occurrence Questionnaire, made more errors on a performance task following failure than did low Thought Occurrence Questionnaire participants, although they completed an equal amount of performance task problems. This finding supports the hypothesis that cognitive interference impairs performance by drawing attention away from the task at hand rather than by reducing actual speed on a task.

#### Suppression and inhibition -- The White Bear Paradigm

Other investigators have focused on the processes and consequences of suppression of thoughts. During a lapse or failure of suppression a thought may occur intrusively, Wegner and Schneider (1989) argued that suppression is a form of mental control that people desire. The topic of suppression is not new and has been an area of psychological study since

Freud (1900/1953) first addressed it.

Wegner and his colleagues devised a paradigm to study the act of thought suppression which involved the use of suppression to avoid a particular thought. The series of studies is known as the White Bear Studies (Wegner, Schneider, Carter, & White, 1987) because the participants were asked to suppress thoughts of a "white bear." In the first study, participants spent five minutes verbalizing their stream of thought and then half of the subjects repeated the verbalizing task and the other half also repeated the task but with additional instructions to try not to think of a white bear. This instruction to not think of a white bear was intended to cause subjects to think about a white bear and then attempt to suppress those thoughts. They were told to ring a bell every time they said or thought "white bear." Subjects rang the bell 6.1 times in five minutes and said "white bear" 1.6 times. Most participants reported using an unfocused self-distraction technique such as trying to think of something interesting. Some of the participants reported using a focused self-distraction by thinking about something else specifically. This technique of focused self-distraction is similar to that taught by many therapists to patients

experiencing pain or unwanted thoughts and emotions (Wegner & Schneider, 1989).

Another study was conducted in which half of the subjects were asked to think about a white bear initially and half were asked not to think about a white bear. In the second time period, both groups were asked to think about a white bear and to ring the bell each time they said or thought "white bear." The group that suppressed the thought originally rang the bell 15.7 times and mentioned the white bear 14.4 times and the rate accelerated over the five minute period. The group that was initially asked to think about a white bear rang the bell 11.8 times and mentioned the white bear 11.5 times. The results indicated that the more one tries to avoid a thought, the greater the preoccupation with the thought will be when it is allowed. This research found evidence of a dynamic effect in which an increase in preoccupation with a thought occurred following suppression. This is similar to Freud's idea that an attempt to deny or repress a thought can result in an obsession with the thought (Freud, 1914/1958). Wegner's findings are an important contribution to the understanding of intrusive thoughts by examining suppression in relationship to the occurrence and control of intrusions.

Past research has focused on the normalcy of intrusions (Rachman & de Silva, 1978) as well as the occurrence of intrusions in relation to stressful or traumatic events (eg. Horowitz, 1975; Pennebaker & O'Heeron, 1984; Sarason, 1984; Silver, Boon, & Stones, 1983). The relationship between reactivity and intrusions has not been directly examined however, and this dissertation examined the intrusion-reactivity relationship during task performance in order to provide information regarding the physiological aspects associated with intrusive thought.

Overall, research has found that individuals who experience intrusive thoughts, either as a state or trait, perform more poorly in demanding situations. The mechanisms underlying this suppressive effect remain to be identified. This dissertation study investigated one possible mechanism, focusing on the relationship between intrusive thoughts and reactivity during task performance. Intrusive thoughts that occur during task performance are relevant to aspects of life that involve concentration and the ability to focus on a task while blocking out irrelevant or distracting thoughts and ideas. If intrusions are associated with increases in heart rate and blood pressure then the repetitive occurrence of

intrusive thought and its accompanying reactivity may play a vital role in the maintenance of the stress response. If an individual is unable to focus on a task and experiences simultaneous, recognizable increases in heart rate and sympathetic arousal, the repetition of this pattern could affect performance further and lead to health problems due to the recurrent activation of the sympathetic nervous system (see Krantz, et al, 1983). If a link can be established between intrusions and reactivity then it also is more likely that intrusive thoughts constitute a mechanism of maintaining chronic stress responses.

This dissertation research evaluated the general tendency to experience intrusions and examined the occurrence of intrusions and reactivity among people who fall along the continuum of this trait. Finding that individuals who reported the general tendency to have intrusions also reported more intrusions and exhibited greater reactivity during the task would indicate that the trait characteristic of experiencing intrusive thought is associated with greater cardiovascular reactivity during a task. The relationship between intrusions and reactivity may be indicative of a stress response that occurs during task performance. The

trait may also indicate a possible predisposition to maintenance of stress responding and its associated health problems.



### Rationale

This study further investigated the relationship between the tendency to experience intrusive thoughts and performance differences by examining the psychophysiological concomitants of intrusive thoughts as well as task performance. Intrusive thought was measured at three levels; state (during a performance task), trait, and occurrence in past week. Heart rate and blood pressure measures were taken before, during, and after task performance in order to examine any differences in physiological reactivity between individuals who reported a greater tendency to experience intrusions and those who experienced fewer intrusive thoughts at both the state and trait levels. The relationship between intrusive thoughts, cognitive performance, and psychophysiological reactivity has not been investigated and this study provides important information to further the understanding of intrusive thoughts.

## HYPOTHESES

1. Individuals who report a trait to experience intrusive thoughts will also report greater levels of intrusions during the task in both the performance-instruction and instruction-only conditions than will those who do not report the trait to experience intrusions. In operational terms, subjects who score high on the trait measure, the Thought Occurrence Questionnaire (independent variable), will also report a high state score on the Cognitive Interference Questionnaire (dependent variable).

2. Individuals who have report the trait to experience intrusive thought will perform more poorly on the anagram task than will participants who do not report this trait, that is, people who score higher on the Thought Occurrence Questionnaire (independent variable) will score fewer correct on the anagram task (dependent variable) than those people who score lower on the Thought Occurrence Questionnaire.

3. Individuals who report a greater number of intrusions during the task will exhibit poorer task performance than

those who do not experience as many intrusions during the task. Participants who score higher on the Cognitive Interference Questionnaire (independent variable) will do more poorly on the anagram task (dependent variable) than will the people who score lower on the Cognitive Interference Questionnaire.

4. Individuals who report the trait to experience intrusions will also report that they have experienced more intrusive and avoidant thoughts, pertaining to a stressful event, in the past week than will the people who do not endorse the trait to experience intrusions. That is, people who score high on the Thought Occurrence Questionnaire (independent variable) will also report more intrusive and avoidant thoughts on the Impact of Event Scale (dependent variable).

5. Individuals who report the trait to experience intrusions will exhibit greater cardiovascular reactivity during the task than will the participants who do not report the trait to experience intrusions, that is, people who score higher on the Thought Occurrence Questionnaire (independent

variable) will exhibit larger blood pressure and heart rate (dependent variables) changes during the task than will individuals who score lower on the Thought Occurrence Questionnaire.

6. Individuals who report a greater number of intrusions during the task will exhibit greater reactivity during the task than will the people who do not report as many intrusions. Participants who score high on the Cognitive Interference Questionnaire (independent variable) will exhibit larger heart rate and blood pressure changes (dependent variables) during the task than will individuals who score lower on the Cognitive Interference Questionnaire.

7. A condition that focuses attention on the task will cause greater stress and decreased performance on the task such that individuals in the performance-instruction condition (independent variable) will perform more poorly on the anagram task (dependent variable) than will individuals who are in the instruction-only condition.

See Table 1 for a list of variables used in this study.

## METHODS

### Sample

A sample of 60 subjects was recruited through advertisements in the university's student newspaper. Potential subjects were screened and excluded if they indicated current or previous psychiatric diagnoses and/or psychiatric hospitalizations, cardiovascular problems, including hypertension, sleep disorders, or drug or alcohol problems. Participants were screened for alcohol use with the following questions; "How often do you have alcoholic drinks? When you drink, how many drinks do you usually have? Was there a time in the past when this was different?" All subjects were between the ages of 18 and 35, 30 were female, and 30 male, and all completed at least an eighth grade level of education.

A power analysis using a conventional medium effect size of 0.5, power of 0.8 and an alpha level of 0.01 was used to determine the number of subjects necessary for the study. A Bonferroni correction was used to set the alpha level at 0.01 to allow for the number of dependent variables used in the

study since an alpha level of 0.05 spread across 7 hypotheses indicated an alpha of 0.007, and statistical tables are set up for an alpha of 0.01. Experiment-wise error can become a problem with such a large number of comparisons, and an alpha level of 0.01 was used to control for such error.

### Design

A mixed correlational/experimental design was used in which participants assigned themselves to one condition (tendency to experience more/fewer intrusions) based on their response to a trait questionnaire and were randomly assigned to the between subjects instruction-only/performance-instruction condition. Participants were randomized into the two experimental conditions.

Measures (see Appendix A)

The Thought Occurrence Questionnaire (TOQ: Sarason, Sarason, Keefe, Hayes, & Shearin, 1986) is a measure of the general tendency to experience intrusive thoughts. The Thought Occurrence Questionnaire consists of 28 items, each rated on a 5-point scale from never to very often. A total score is obtained by summing the ratings of each question, the range of scores is from 0 to 112. Three factors have been identified in the measure; thoughts of social relations and emotions unrelated to the task, thoughts of escape from the task, and task-relevant thoughts. The total Thought Occurrence Questionnaire score will also be used in this study. The test-retest reliability of the Thought Occurrence Questionnaire is .81 (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986).

The Cognitive Interference Questionnaire (CIQ: Sarason & Stoops, 1978) was developed to assess the thoughts that intrude while a person is working on a task. The Cognitive Interference Questionnaire consists of 22 items which are rated on 5-point scales (1=never, 5=very often) for frequency

of particular types of intrusive thought and is administered after a performance task. Ten of these items refer to thoughts about the task just completed, the additional items consist of intrusive non-task related thoughts and the final item is a 7-point rating of mind wandering during the task. The subscales are referred to as "task-irrelevant interference" and "task-related interference", the mind-wandering item is considered to be a separate subscale and each subscale is scored by adding the ratings given to each item in the subscale. The Cognitive Interference Questionnaire's internal consistency is satisfactory ( $\alpha = .71-.76$ ; Hunsley, 1987; Mikulincer, Kedem, & Zilkha-Segal, 1989). Reliability of the Cognitive Interference Questionnaire has been reported at .75 (Hunsley, 1987).

The Symptom Checklist 90-R (SCL-90-R: Derogatis, 1977) was used to obtain a measure of symptoms which participants found bothersome or distressing in the seven days prior to the study. Participants indicated which of the ninety symptoms they found distressing and provided a severity rating for each item. The Symptom Checklist 90-R provides a global index of symptom reporting as well as intensity of distress scores for



nine subscales, including somatic complaints, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Ten scores will be obtained from the Symptom Checklist 90-R; the nine subscales, and the global severity index (GSI) which is the average severity of all endorsed symptoms. Reliability coefficients for the subscales range from .84 for anger to .90 for depression, and the subscales correlate fairly well with MMPI scales measuring similar constructs (Derogatis, 1977). The Symptom Checklist 90-R was used as an indicator of ongoing stress for the participants.

The Impact of Event Scale (IES: Horowitz et al., 1979) instructs participants to think about experiences associated with a particular stressor and to report the frequency of intrusive imagery or avoidance of relevant stimuli associated with the stressor in the past seven days. Participants were asked to indicate a stressful event that occurred in the last twelve months and to focus on that event for completion of the questionnaire. The measure consists of fifteen items each rated on a 4-point frequency scale of "not at all" to "very often." Seven of these items make up the intrusive subscale

and the remaining eight form the avoidance subscale. A total Impact of Event Scale score is also obtained by adding the two subscales. This study used the subscales and the total score in order to measure the extent of intrusive and avoidant thoughts and behaviors that occurred in the past week. The split-half reliability of the total scale is 0.86 and the internal consistency is also high, with Cronbach's Alpha of 0.78 for the intrusion subscale and 0.82 for the avoidance subscale. A correlation of 0.42 between the subscales indicates that the Impact of Event Scale is measuring two similar, but distinct concepts (Horowitz, Wilner, & Alvarez, 1979).

A modified version of the Schedule of Recent Experiences (SRE: Holmes & Rahe, 1967; Rahe, 1975) was used to measure the frequency of life change events and their perceived impact in the last six months. Participants indicated which of the many events listed they experienced in the past six months. The items range from minor (e.g., dental work) to major (e.g., death of a loved one) and each endorsed item is also given an adjustment rating so that the magnitude of the event for each individual can be better assessed. This questionnaire was

used to control for the occurrence of stressful events in the six months prior to the study.

The Profile of Mood States (POMS: McNair, Lorr, & Droppleman, 1971/1981) is a 65-item adjective checklist that is rated on a five-point scale (0=not at all, 4=extremely). The Profile of Mood States consists of six subscales; tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment, and an overall distress score representing total mood disturbance. This scale was given in two different versions; one asking how participants feel currently was given prior to the task and the other, asking how participants felt during the task was given after the task was completed in order to check for any mood manipulation that may have occurred during the task.

A shortened version of Norris' traumatic history questionnaire (THQ) was used to determine the occurrence of traumatic events in the participant's lifetime (Norris, 1990). Eight items were used (eg. Did anyone ever beat up or attack you? Did a close friend or family member ever die because of an accident, homicide, or suicide?) in order to assess

lifetime trauma. Norris' original trauma history measure consists of 28 items, but the shortened version retains items from all seven basic categories: Robbery, physical assault, rape, serious motor vehicle accident, accidental bereavement, injury or property loss (fire, disaster), and evacuation or learned of hazard. The present study used the total number of traumatic events experienced in order to control for these unusual life events and their potential effects on stress and functioning.

The Pittsburgh Sleep Quality Inventory (PSQI) is a 19-item questionnaire asking subjects to rate the average quality, pattern, and habitual duration of sleep and daytime dysfunction over the previous month (Buysse et al., 1989). The test-retest reliability of the total scale is 0.85 and the internal consistency is high, with Cronbach's alpha of 0.83. It has been shown that good sleep is integral to adaptation and stress interferes with quality of sleep (Cartwright, 1983; Dew et al., 1994). This questionnaire was used to measure (and allow control of) the influences of sleep problems on intrusive thought and task performance.

A questionnaire assessing demographic information was administered in order to obtain information regarding age, gender, race, income, employment, education, and marital status. Participants were also asked how many hours of sleep they had in the past 24 hours and how much caffeine and alcohol they consumed in the past 24 hours.

Heart rate and blood pressure measures were taken using an automated heart rate and blood pressure monitor. This instrument was set to take heart rate and blood pressure readings every two minutes, allowing collection of five baseline measures, seven task-period measures, and two post-task readings.

Experimental Task (see Appendix B)

An anagram task (Sarason, 1961) was used as the performance measure in this study. The words for this task were taken from a list of difficult anagrams compiled by Sargent (1940). The task consists of 13 scrambled words with the following instructions:

On the next page you will see a series of disarranged words. Your job will be to rearrange each group of letters so that they make a meaningful English word. Start when you are so instructed. Stop at the stop signal.

In addition, to these instructions one-half of the participants received printed instructions indicating that the task was a predictor of intelligence level. Sarason and his colleagues have repeatedly used this intelligence manipulation in order to make the task a more demanding one (Sarason, 1961, 1984; Sarason, Sarason, Keefe, Hayes, & Shearin, 1986) and have found that level of cognitive interference and task performance are sensitive to the instructions given with a

task (Sarason, 1981, 1984; Sarason, Sarason, Keefe, Hayes, & Shearin, 1986; Sarason & Stoops, 1978). This dissertation used the anagram task in the exact format that Sarason has used throughout his research. Participants were randomly assigned to the instruction condition such that half of the males and half of the females were in each condition. The additional intelligence instructions appeared as follows:

Ability to organize material such as the letters on the next page has been found to be directly related to intelligence level. High school students of above average intelligence (IQ greater than 100) and most college students should be able to successfully complete the task.

Anagrams were chosen as the task because they have been used frequently in research on cognitive-intellectual skills and they minimize differences in knowledge or experience. It has also been reported that males and females perform equivalently on anagram tasks, thereby avoiding possible gender biases (Arkin, Detchon, & Maruyama, 1982; Bourne, Ekstrand, & Dominowski, 1971; Mendelsohn, Griswold, &

Anderson, 1966). Participants were given 15 minutes to work on the task. Sarason originally allowed 18 minutes for the anagram task (Sarason, 1961), but it has been reported since then that a few subjects completed the anagrams within the 18-minute period (Arkin et al, 1982; Sarason & Sarason, 1986a).

Variations of this anagram task have been used with success by several researchers. These variations include computerizing the task (Blair, Wing, & Wald, 1991), presenting the items using slides (Casanova, Domanic, McCanne, & Milner, 1992; Suarez & Williams, 1989; 1990), using unsolvable anagrams (Casanova et al, 1992; Feather, 1966; Niaura, Wilson, & Westrick, 1988; Prowse & Wilson, 1992), and performing the task under conditions of harassment (Suarez & Williams, 1989; 1990). However, most researchers have continued to use the task in Sarason's 1961 format using solvable anagrams printed on paper and performed under non-harassment conditions (Arkin et al, 1982; Hackett & Campbell, 1987; Johnson, 1989; Kumar & Kumari, 1988; Sarason, 1961; Sarason et al, 1986; Travis, 1982; Zarantello, Johnson, & Petzel, 1979; Zarantello, Slaymaker, Johnson, & Petzel, 1984).

Researchers have reported increases in heart rate and blood pressure readings during anagram tasks similar to the



one used in this research. Dembroski et al (1978) used a task consisting of 10 items to be solved in 3 minutes and found an average increase in systolic blood pressure of 13 mmHg, a diastolic increase of 7 mmHg, and a heart rate increase of 6 beats per minute. Another study using a task of 10 anagrams in 10 minutes also reported increases in systolic and diastolic blood pressures and heart rate (Johnson, 1989).

### Procedure

Informed consent was obtained and participants were seated at a table. They sat quietly for a total of twenty-five minutes. During the first fifteen minutes they acclimated to the research setting and completed the baseline Profile of Mood States and the demographic questionnaire. A heart rate and blood pressure monitor/cuff was placed on the participant's non-dominant arm and participants sat quietly for the next ten minutes during which the cuff was set to inflate every 2 minutes in order to obtain five baseline blood pressure and heart rate readings. Participants then worked on the 15-minute anagram task consisting of thirteen difficult anagrams (Sarason, 1961). Half of the participants received the task with printed instructions indicating that the anagram task was a predictor of intelligence level along with instructions on task completion (performance-instruction). The other half of the participants received the task with completion instructions only (instruction-only).

Participants were randomly assigned to the performance-instruction group or the instruction-only group, with half of the males and half of the females in each condition. During

the anagram task the cuff inflated every 2 minutes so that a reading was taken at 2, 4, 6, 8, 10, 12, and 14 minutes into the task and two readings were taken after the task was completed, at 16 and 18 minutes. After the task, participants spent approximately 60 minutes completing several questionnaires in the following order: 1) Cognitive Interference Questionnaire, 2) Profile of Mood States (during task version), 3) Symptom Checklist 90-R, 4) Trauma History Questionnaire, 5) Thought Occurrence Questionnaire, 6) Schedule of Recent Events , 7) Impact of Event Scale, and 8) Pittsburgh Sleep Quality Index. Participants were then debriefed, paid \$20, and thanked for their participation.

## RESULTS

### Overview

*Group comparability:* Comparability of groups was examined using chi-square or t-tests depending on whether the variable of interest was categorical or continuous in nature. Analyses were conducted comparing the performance-instruction and instruction-only groups on age, income, marital status, employment status, ethnic group, educational level, Profile of Mood States scores, Symptom Checklist 90-R scores, Trauma History Questionnaire scores, the global Pittsburgh Sleep Quality Index score, recent life events, sleep in the past 24 hours, and alcohol and caffeine use in the past 24 hours. Comparisons were also conducted for baseline measures of mood, heart rate and blood pressure. These same variables were also examined for differences between the high and low groups on the trait intrusion measure, the Thought Occurrence Questionnaire, as divided by a median split.

Gender was included as a blocking variable, although past research has found very few gender differences for the anagram

task (Arkin, Detchon, & Maryuma, 1982; Bourne, Ekstrand, & Dominowski, 1971; Mendelsohn, Griswold, & Anderson, 1966), or intrusive thoughts (Rachman & de Silva, 1978), or Thought Occurrence Questionnaire scores (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986).

T-tests were performed to examine any differences in baseline heart rate and blood pressure measures, as well as reactivity levels and baseline mood disturbance between female and male participants. Additional variables were examined using t-tests to explore any gender differences on intrusive thoughts (state and trait), life events, traumatic history, mood change during the task, sleep disturbances, and number of anagrams solved correctly.

*Performance:* T-tests were performed to examine differences in the number of anagrams completed correctly by each group. A 2 X 2 ANOVA (performance-instruction/instruction-only and high/low Thought Occurrence Questionnaire) was performed in order to examine any differences between groups on anagram performance. Correlations were also computed to examine the relationship between task performance and reactivity, intrusive thought scores, and mood change during the task. T-

tests were conducted in order to provide manipulation checks to assess the stressfulness of the task by examining mood change from baseline to task.

*Reactivity:* Physiological variables were examined using four baseline heart rate and blood pressure readings (averaged, with the first reading ignored due to the adjustment that occurred when the cuff inflated for the first reading), the average of the seven during-task readings, and the average of the two post-task readings. Means were calculated for the heart rate and blood pressure readings for baseline and during task measures after pairs t-tests indicated that there were no differences among the various readings at different timepoints. The post-task readings were not different from the during task measures and so were excluded from any further analyses. Change scores were calculated by subtracting the baseline average from the during task average for heart rate and blood pressure measures. T-tests were conducted to investigate reactivity differences between the two groups and males and females, as well as to provide a manipulation check. Repeated measures ANOVAS were also conducted to include another examination of the change in reactivity from baseline

to task performance.

*Mediators of performance and reactivity:* Correlations were performed to investigate the relationship between intrusive thoughts at both the state and trait level and baseline psychological characteristics and mood disturbance, as well as their relationship to one another. Multiple regression and correlation analyses (MRC) were used to examine the extent to which Thought Occurrence Questionnaire, Cognitive Interference Questionnaire, and experimental group predicted performance on the anagram task, intrusive thoughts and cognitive interference, and reactivity. MRC's were performed in a forward hierarchical style controlling for variables that were related to the dependent variable of interest such as demographic variables, baseline heart rate and blood pressure, reported symptoms on the Symptom Checklist 90-R, Profile of Mood States scores, scores on the Schedule of Recent Events, Trauma History Questionnaire events, and the global Pittsburgh Sleep Quality Index score. Each equation, then, entered age, gender, race, income, employment, education, marital status, heart rate and blood pressure, Symptom Checklist 90-R, Profile of Mood States, Schedule of Recent Events, Trauma History

Questionnaire, and Pittsburgh Sleep Quality Index scores that were correlated with the dependent variable as a block, followed by the predictor variable (Thought Occurrence Questionnaire score, Cognitive Interference Questionnaire score, or group). Dependent variables included anagram score, Cognitive Interference Questionnaire and Impact of Event Scale scores, and heart rate and blood pressure readings.

#### Group Comparability

T-tests indicated that the groups were similar in age, reported caffeine and alcohol use in the past 24 hours, amount of sleep in the past 24 hours, baseline mood state, Symptom Checklist 90-R scores, Trauma History Questionnaire scores, the global Pittsburgh Sleep Quality Index score, number of recent life experiences, and the adjustment required for recent life events (see Tables 2 and 3). Chi-square analyses showed that groups were also similar in ethnic background, educational level, marital status, and employment status, and income level (see Table 2). Eighty three percent of participants were Caucasian, 8 percent were Asian, 7 percent were African American, and 2 percent were Hispanic; eighty



percent reported having some college, 8 percent high school, 5 percent college degree, 5 percent graduate degree, and 2 percent some graduate work; Eighty eight percent of the subjects were single, 8 percent were married, and 3 percent were currently living with a partner; Ninety percent of participants were full-time students, 8 percent were employed full-time, and 2 percent were unemployed.

#### Gender Differences

Gender did not play a large role in the relationships examined in this study. Baseline systolic blood pressure was higher in men than women,  $t(52) = -3.67$ ,  $p < .001$  ( $114.9 \pm 12.8$  mmHg vs.  $104.4 \pm 9.1$  mmHg). All other baseline and task levels of heart rate and blood pressure were similar across gender and there were no differences in baseline mood as reported on the Profile of Mood States. No gender differences were found for measures of intrusive thought (state or trait), life events, traumatic history, sleep quality, mood change during the task, or number of anagrams correct.

#### Performance

No differences were found between groups on task performance as measured by total number of anagrams correct, (see Figure 1) with both groups completing an average of  $4.3 \pm 2.3$  anagrams correctly with a range of 0 to 10,  $t(58) = -.05$ ,  $p < .96$ . No differences were found on task performance based on the Thought Occurrence Questionnaire measure of tendency to experience intrusions (see Figure 2). A 2 X 2 ANOVA (performance-instruction/instruction-only and high/low Thought Occurrence Questionnaire scores) revealed no differences on task performance based on instructional group or level of intrusions,  $F's(1,56) = 0.01$  and  $0.09$ , respectively,  $p's < .95$ . Correlation analyses indicated that there was no relationship between number of anagrams solved correctly and intrusive thoughts, either state or trait. There was also no relationship between number of correct anagrams and reactivity or mood change during the task. Paired t-tests indicated that Profile of Mood States scores increased from baseline to task for the confusion-bewilderment,  $t(58) = -8.80$ ,  $p < .001$ , depression-dejection,  $t(59) = -3.26$ ,  $p < .002$ , and tension-anxiety,  $t(59) = -7.03$ ,  $p < .001$ , subscales as well as the total mood disturbance score,  $t(57) = -2.77$ ,  $p < .008$ , whereas the vigor-activity subscale

showed a decrease from baseline to task,  $t(59) = -8.80$ ,  $p < .001$ , (see Table 4).

### Reactivity

T-tests and repeated measures ANOVAS revealed that there were no differences between groups on reactivity during the anagram task (see Figures 3, 4, 5, & 6). Both instruction conditions showed an increase in diastolic blood pressure from baseline to task readings  $t(59) = -5.44$ ,  $p < .0001$ ,  $F(1,58) = 29.17$ ,  $p < .001$ , ( $66.5 \pm 8.9$  mmHg vs  $70.1 \pm 9.1$  mmHg) and an increase in heart rate  $t(59) = -7.38$ ,  $p < .0001$ ,  $F(1,58) = 56.34$ ,  $p < .001$  ( $72.1 \pm 10.4$  bpm vs.  $78.7 \pm 11.8$  bpm), but there was no change in systolic blood pressure from baseline to task. There were no gender differences in reactivity.

### Mediators of Performance and Reactivity

Multiple regression analyses were conducted to determine if state and trait measures of intrusive thought predicted reactivity, task performance, and intrusive thought (trait predicting state measures).

**Trait Intrusive Thought:** The Thought Occurrence Questionnaire

was the measure of the trait of experiencing intrusive thought for this study. Correlations indicated that individuals with a higher Thought Occurrence Questionnaire total score also reported higher state intrusions (Cognitive Interference Questionnaire), and higher Impact of Event Scale, and GSI Symptom Checklist 90-R scores, and more mood change during the task ( $r$ 's = .36-.58,  $p$ 's < .01, see Table 5) showing that the trait experience of intrusive thought was related to state intrusion levels, greater symptom severity, and more task-related mood change. Multiple regressions were conducted in a forward hierarchical style by first entering any demographic or psychological background variables that were correlated with the dependent variable of interest, followed by the predictor variable. Multiple regression analyses revealed that the total score on the Thought Occurrence Questionnaire was not a significant predictor of reactivity during the task, adding no significant change in variance accounted for above that contributed by variables correlated with reactivity such as age, gender, and baseline readings. For example, with prediction of systolic blood pressure,  $R^2$  = .81 after age, gender, and baseline were controlled for,  $\Delta R^2$  = .005,  $p$  < .22 with the addition of the Thought Occurrence

Questionnaire total score as a predictor. Similar results were found for diastolic blood pressure and heart rate with  $\Delta R^2 = .007$ ,  $p < .24$ , and  $\Delta R^2 = .002$ ,  $p < .58$ , respectively when Thought Occurrence Questionnaire score was entered. Intrusive and avoidant thoughts as measured on the Impact of Event Scale were not predicted by the Thought Occurrence Questionnaire score. Number of anagrams solved correctly was also not predicted by the trait intrusive thought measure. The Thought Occurrence Questionnaire did predict one of the subscales of the Cognitive Interference Questionnaire, the state measure of intrusions experienced during the task, but the amount of variance (5 percent) was small and was limited to one of the subscales of the Cognitive Interference Questionnaire, the "task-related interference" subscale,  $\Delta R^2 = .05$ ,  $R^2 = .44$ ,  $F(5,54) = 8.56$ ,  $p < .0001$  (controlling for marital status, total mood disturbance during the task, the global Pittsburgh Sleep Quality Index score, and the Cognitive Interference Questionnaire A subscale, all of which were found to be correlated with the Cognitive Interference Questionnaire B subscale score).

**State Intrusive Thought:** The Cognitive Interference

Questionnaire was the measure of intrusive thought that occurred during the anagram task. Correlations indicated that individuals who reported a higher level of "task-irrelevant interference" during the task also reported greater mood disturbance during the task and higher GSI scores on the Symptom Checklist 90-R ( $r$ 's = .47-.57,  $p$ 's < .01). Participants who reported greater "task-related interference" also reported greater mood disturbance ( $r$ 's = .33-.41,  $p$ 's < .01). Multiple regressions were conducted to examine the predictive power of the Cognitive Interference Questionnaire by first entering any demographic and baseline psychological variables that were related to the dependent variable, followed by the Cognitive Interference Questionnaire. Similar to findings regarding the Thought Occurrence Questionnaire, the Cognitive Interference Questionnaire was not predictive of any dependent variables including reactivity, heart rate and blood pressure levels during the task, or number of anagrams solved correctly.

## DISCUSSION

The principal findings of this study were that trait or state intrusive thoughts do not reliably affect task performance or reactivity on anagrams. The task used in this study was considered to be a stressful experience as indicated by a change from baseline in diastolic blood pressure and heart rate, as well as an increase in total mood disturbance as reported on the Profile of Mood States across all groups. The finding that this seemingly stressful task experience was not associated with performance or intrusive thoughts does not support the hypotheses examined for this study.

Although instructions were used as a manipulation in order to increase the potential stress level associated with the task; performance-instruction and instruction-only, no differences were found between the two groups on task performance, reactivity, or mood change indicating that the task alone was a stressful experience regardless of the instructions accompanying it. The average number of anagrams solved, 4.3, was comparable to those reported by Sarason et

al. (1986) who found a range of means from 3.3 to 5.1 correct.

The two groups were comparable across demographic variables and psychological background. Gender differences were found for one of the physiological variables. Males had a higher baseline systolic blood pressure than females, but other baseline and task levels of heart rate and blood pressure were similar across gender. No differences were found between males and females for baseline mood, mood during task, or change in mood. Both women and men reported a greater level of total mood disturbance during the task than prior to the task, regardless of group.

No group differences were found for reactivity to the anagram task. Both groups exhibited an increase in diastolic blood pressure from baseline to task and an increase in heart rate from baseline to task. Increases from baseline were comparable in the two experimental groups. There were no significant changes for systolic blood pressure. Similarly, state and trait measures of intrusive thought were not related to task performance or reactivity.

The trait measure of intrusive thought, the Thought Occurrence Questionnaire, did not predict heart rate and blood pressure change during the task when controlling for baseline



readings. Intrusive and avoidant thoughts experienced in the past week, as measured by the Impact of Event Scale , were not related to the Thought Occurrence Questionnaire either. The Thought Occurrence Questionnaire did predict one of the subscales of the Cognitive Interference Questionnaire, the state measure of intrusions experienced during the task, suggesting that the tendency to experience intrusive thoughts is a valid construct.

The Cognitive Interference Questionnaire provided a predictive pattern similar to that of the Thought Occurrence Questionnaire. The Cognitive Interference Questionnaire did not predict any dependent variables, including heart rate and blood pressure at baseline or task levels, or number of anagrams solved correctly. Both the Cognitive Interference Questionnaire and the Thought Occurrence Questionnaire were correlated with total mood disturbance during the task, indicating that individuals who reported more intrusions experienced a greater mood disturbance.

#### Review of Hypotheses

Of the seven hypotheses proposed in this study, only one was supported and that was the hypothesis that the trait or

tendency to experience intrusive thought would predict state intrusive thought measures, and the experience of intrusions during a task. Total Thought Occurrence Questionnaire score was correlated with both subscales of the Cognitive Interference Questionnaire, but multiple regression analyses indicated that only the "task-related interference" subscale was significantly predicted by the trait intrusive thought measure. However, the total Thought Occurrence Questionnaire score did not predict intrusive thought experienced in the past week as indicated on the Impact of Event Scale.

The remaining hypotheses were related to reactivity and task performance, neither of which were correlated with or could be predicted by either state (Cognitive Interference Questionnaire) or trait (Thought Occurrence Questionnaire) measures of intrusive thought. The last hypothesis was that the type of instructions given would affect performance on the anagram task and this too, was not confirmed, suggesting that the instructional content manipulation had no effect on task performance.

These findings were not expected in light of previous research. Sarason and his colleagues have successfully used the anagram task and its instructional manipulation to provide

reliable group differences in task performance and intrusive thought for decades (Sarason, 1961; Sarason, et al., 1986). That this study found no group differences is troubling, though there is nothing to suggest that these subjects were any different from those used previously. Variables such as education level and age were similar between Sarason's research and this dissertation sample and the groups performed within the range of means reported in these past studies. Taking into account the reactivity and mood change findings, it would seem that the task was a stressful experience regardless of instructional content. The increases in mood disturbance and reactivity across instructional groups indicated that the task was stressful for all participants. There was an increase in arousal and distress, but no relationship existed between intrusions and these indicators of stress.

Contrary to the findings of past research, the experience of a stressful task was not related to the experience of intrusive thoughts (Sarason, et al., 1986). Neither state nor trait measures of intrusive thought predicted reactivity during the anagram task or performance on the task. Sarason et al. (1986) reported a relationship between trait intrusive

thought, as measured on the Thought Occurrence Questionnaire, and performance on the same anagram task, such that individuals reporting a greater level of the trait performed more poorly on the anagram task. Increased state intrusive thought, measured by the Cognitive Interference Questionnaire was also related to poorer task performance. Mikulincer and his colleagues have also reported a consistent relationship between high Thought Occurrence Questionnaire scores and poorer task performance (Mikulincer, 1989; Mikulincer et al., 1990). These findings were not replicated in the current study (see Table 6).

Intrusive thoughts were discussed by Sarason and his colleagues as interfering with performance by taking up cognitive capacity and thereby allowing less cognitive space for the performance of necessary cognitive functions. They also wrote of how the intrusions may interrupt the course of information processing by narrowing attentional focus, distorting encoding and planning strategies, and influencing responses that may be selected in order to cope with the challenge at hand (Sarason, 1984; Sarason & Stoops, 1978). Martin and Tesser (1989) also put forth a theory that intrusions take up cognitive capacity therefore affecting the

possible occurrence of other cognitive activity.

This dissertation does not support the theories that occurrence of intrusions occupies cognitive space that is necessary for task performance. All subjects in this study, regardless of trait or state level of intrusions, performed equally well on the anagram task thereby providing no support for theories regarding cognitive capacity that is occupied by intrusive thoughts. The dissertation presented here may have used a task that was not engaging enough to elicit interference by intrusions yet the task seemed to cause distress, as evidenced by mood and reactivity changes, and this stressful experience should have been associated with increased intrusions according to previous literature (eg. Sarason et al., 1986).

The focus of the current study was not clinical outcomes but is derived from a parallel of Sarason's work which hypothesizes that interference with performance leads to the experience of stress. In this case, the occurrence of intrusive thoughts during the anagram task would cause stress for the individual thereby affecting task performance, mood, and physiological variables. This study however, found differences in mood and physiological variables but not in

actual task performance indicating that stress was experienced but without performance effects. This finding is not supportive of the notion that stress would affect task performance. The occurrence of intrusions was not different between the two conditions nor was there a difference in level of reactivity. These data taken together indicated that although the task was stressful for all participants there were no differences in intrusive experience or in task performance. Sarason's theory that intrusive thoughts would be distracting or take up cognitive capacity and thereby interfere with task performance is not supported by the findings of this study. Rather it appears that intrusions had no relationship with task performance or the experience of stress.

Potential reasons for these inconsistencies are not readily apparent. The measures used and levels of performance among the studies were comparable and the task format was identical. The only difference that is suggested by comparing this study to others is the measurement of heart rate and blood pressure during the task. Perhaps this measurement process is stressful itself and overrode or interacted with any differences that the instructions or intrusion tendencies

may provide. Even if it is true that the task was stressful for all participants it is still surprising that no relationship was found between intrusive thought and task performance or reactivity. Lack of power in the study could be a reason for the lack of findings in this dissertation. A post-hoc power analysis using an  $\alpha = 0.01$ , power = 0.8, and the actual effect size of 0.1 indicated that an unreasonably large sample size would have been necessary to attain significance for this study ( $N = 284$ ). This post-hoc power analysis suggests that inadequate power is not a viable explanation for the lack of support for the hypotheses.

Another potential explanation of differences lies in the level of trait intrusions as reported on the Thought Occurrence Questionnaire. Sarason reported a range of scores from 11 to 112 on the Thought Occurrence Questionnaire (Sarason et al., 1986) as compared to this study's range of 29 to 109. This study may be missing those individuals on the lower end of the trait of intrusive experience and it could be the difference in the range of this trait that partially accounts for the lack of expected findings regarding intrusions and reactivity during task performance. Perhaps the individuals who report a lesser tendency to experience

intrusions are responsible for the differences in performance seen in Sarason's work. Because this dissertation study did not include participants at the lower end of the trait the expected effects may have been lost. It may be that the subjects who report lower scores on the Thought Occurrence Questionnaire are not as apt to respond to a task in a stressful manner, these individuals may experience less stress, as well as fewer intrusions. It is not possible to examine differences in the stress response between Sarason's work and this dissertation because Sarason did not perform manipulation checks in order to assess the reaction to the anagram task. This dissertation study found that all participants responded as if the task were stressful but perhaps the inclusion of people at the lower end of the intrusive trait would have demonstrated otherwise.

This study was conducted in order to examine the relationship between intrusive thoughts and reactivity, specifically during task performance. The findings are inconsistent with prior findings and suggest that there is no link between level of intrusion and task reactivity. During a stressful task, all individuals exhibited an increase in heart rate and blood pressure, regardless of intrusive



thoughts experienced at the state or trait level.

It has been suggested that intrusions may serve as a mechanism by which chronic stress is maintained (Baum, Cohen, & Hall, 1993). This study indicates that stress may be maintained by intrusive thoughts but that differences in reactivity are probably not key mechanisms by which this stress process continues. The search for a mechanism by which intrusions affect distress and alter task performance is not concluded with this study. However, these findings are clearly inconsistent with previous studies (Mikulincer, 1989; Mikulincer et al., 1990; Sarason, et al., 1986).

Further research along these lines should be pursued but may be benefited by implementation of a different performance task or perhaps a manipulation to increase intrusive thought by focusing on a personally relevant stressor rather than a benign laboratory stressor. It is important to discover the mechanisms that underlie the stress response so that scientists may begin to form methods of alleviating and blocking prolonged stress responses.

## SUMMARY

This study examined the relationship between intrusive thoughts and reactivity during task performance. Two groups, one given stress-enhancing instructions for the task, and the other given only completion instructions, worked on an anagram task while having their heart rate and blood pressure measured every two minutes and then completed a battery of questionnaires.

Results indicated that the groups performed equally on the task and exhibited similar reactivity patterns regardless of the instructional group they belonged to. Differences involving level of intrusive thought were examined and no differences were found. When level of intrusive thought, from either a trait or state measure, was examined there was no relationship with task performance or reactivity. The only relationship found was that between the trait of intrusive experience and the reported occurrence of "task-related interference" while working on the anagram task. All groups responded to the task with an increase in systolic blood pressure and heart rate as well as increase in total mood

disturbance indicating that the task was a stressful experience regardless of instructional content. Future research needs to continue the examination of intrusive thoughts as a mechanism for the maintenance of stress although a methodology different from that used in the current study should be considered.

Table 1: Variables in Intrusive Thought and Task Performance Study

Control Variables	Independent Vars.	Dependent Vars.
Demographics	Thought Occurrence Questionnaire (TOQ)	Cognitive Interference Questionnaire (CIQ)
a) age	a) task-irrelevant thoughts	a) task-irrelevant interference
b) gender	b) escape thoughts	b) task-relevant interference
c) race	c) task-relevant thoughts	Anagram Score
d) religion	d) total score	Impact of Event Scale
e) income	Group	a) intrusive
f) employment	a) performance-instruction	b) avoidant
g) marital status	b) instruction-only	c) total score
SCL-90-R	Cognitive Interference Questionnaire (CIQ)	Heart rate and Blood Pressure
a) somatic		
b) obsessive-compulsive	a) task-irrelevant interference	a) baseline
c) interpersonal sensitivity	b) task-relevant interference	b) during task
d) depression		c) post-task
e) anxiety		
f) hostility		
g) phobic anxiety		

h) paranoia		
i) psychoticism		
j) GSI 90		
Schedule of Recent Events		
a) total number		
b) adjustment score		
POMS		
a) tension-anxiety		
b) depression-dejection		
c) anger-hostility		
d) vigor-activity		
e) fatigue-inertia		
f) confusion-bewilderment		
g) overall distress score		
Pittsburgh Sleep Quality Index, total score		
Trauma History Questionnaire, total number of events		
Caffeine in past 24 hours		
Alcohol in past 24 hours		
Sleep in past 24 hours		

Table 2: Sample demographic characteristics

N = 60, 30 female and 30 male

Mean Age (in years):	21.0 ± 4.0
Mean Income:	\$30,001 to \$40,000
Marital Status:	88% single 8% married 3% living with a partner
Employment Status:	90% full-time students 8% employed full-time 2% unemployed
Ethnic Group:	83% Caucasian 8% Asian 7% African American 2% Hispanic
Education Level:	80% some college 8% high school 5% college degree 5% graduate degree 2% some graduate work

Table 3: Baseline psychological characteristics  
(all values reported are means)

POMS total mood disturbance:	45.0 ± 27.5
SCL-90-R global severity index:	0.6 ± 0.4
Number of events on THQ:	1.3 ± 1.3
Global PSQI score:	6.3 ± 3.9
Number of recent life experiences:	10.3 ± 5.4
Adjustment score on SRE:	336.7 ± 293.5
Caffeinated beverages consumed in past 24 hours:	2.0 ± 1.6
Alcoholic beverages consumed in past 24 hours:	0.3 ± 0.9
Hours of sleep in past 24 hours:	7.0 ± 1.6

Table 4: Arousal and distress related to anagram task performance  
(all values reported are means)

	Baseline	During Task
ave. systolic blood pressure	109.6 $\pm$ 12.2	109.1 $\pm$ 13.2
ave. diastolic blood pressure	66.5 $\pm$ 8.9	70.0 $\pm$ 9.1**
ave. heart rate	72.1 $\pm$ 10.4	78.7 $\pm$ 11.8**
POMS confusion- bewilderment	5.5 $\pm$ 4.2	11.4 $\pm$ 6.1**
tension-anxiety	6.6 $\pm$ 5.2	12.5 $\pm$ 7.8**
depression- dejection	5.7 $\pm$ 8.1	9.8 $\pm$ 10.4**
anger-hostility	5.2 $\pm$ 7.9	7.4 $\pm$ 8.5
vigor-activity	14.7 $\pm$ 6.5	8.5 $\pm$ 6.6**
fatigue	7.4 $\pm$ 6.4	7.0 $\pm$ 6.5
total mood disturbance	45.0 $\pm$ 27.5	56.6 $\pm$ 33.8**

\*\* difference significant at  $p < .01$



Table 5: Correlations of the trait to experience intrusive thought (Thought Occurrence Questionnaire) with stress and intrusion variables.

	TOQ total score
CIQA score	.39
CIQB score	.44
IES total score	.37
GSI (SCL-90-R)	.58
Change in total mood disturbance (POMS)	-.36

All correlations are significant at  $p < .01$

Table 6: Studies examining the Thought Occurrence Questionnaire (TOQ) and task performance

Author(s) and Date	Task	Findings
Mikulincer, 1989	visual search task with memory component	High TOQ subjects made more errors than low TOQ subjects
Mikulincer, Babkoff, Caspy, & Weiss, 1990	visual discrimination task	Reaction time longer for subjects with higher TOQ scores
Sarason, Sarason, Keefe, Hayes, & Shearin, 1986	Study 1: anagram task	Greater TOQ related to poorer task performance and an instruction by TOQ interaction, in which high TOQ subjects in performance-instruction group performed more poorly
	Study 2: proofreading, then anagram task	Instruction by TOQ interaction such that a task-orientation condition was associated with better performance for high TOQ subjects versus neutral conditions which were best for low TOQ subjects

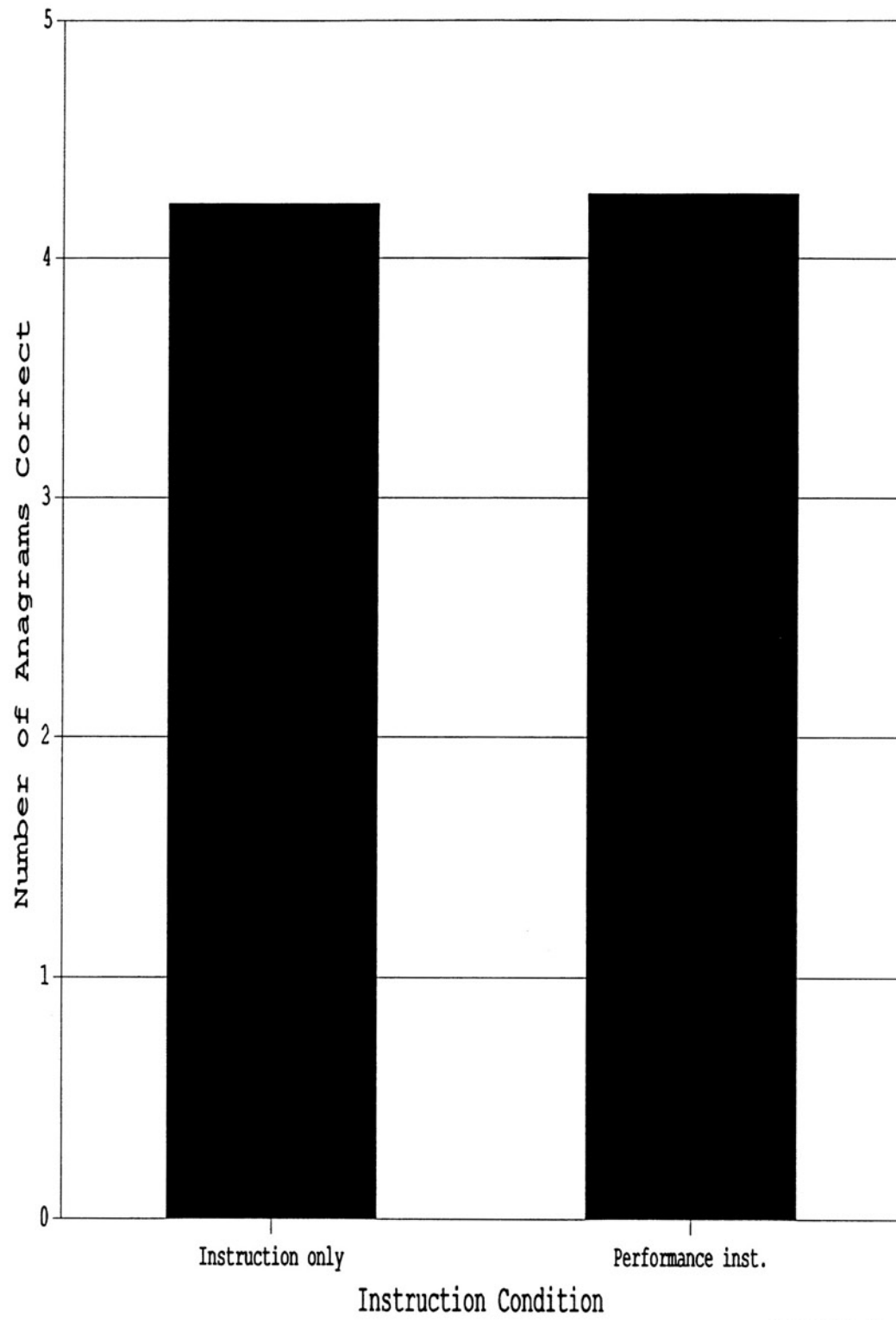


Figure 1

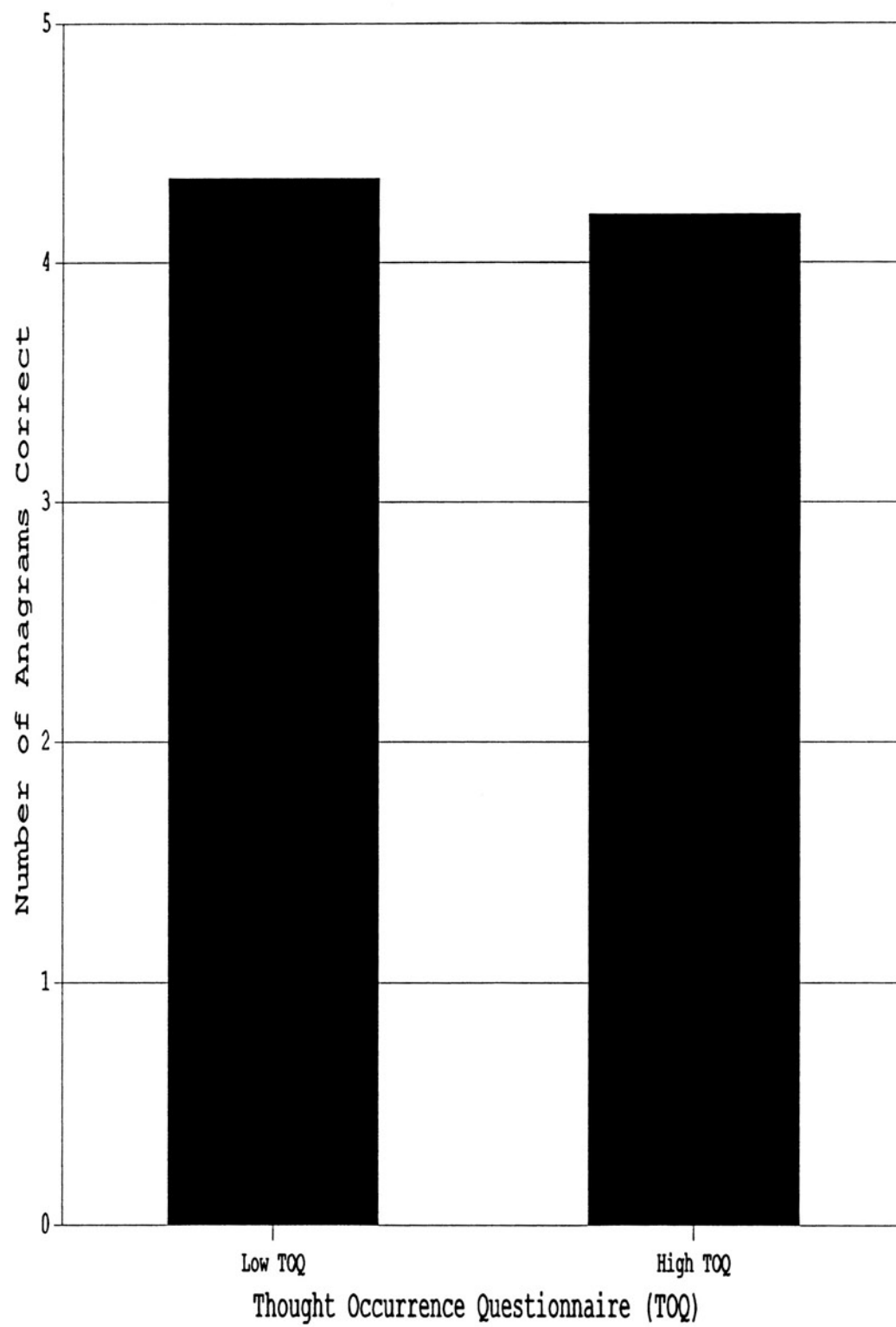


Figure 2

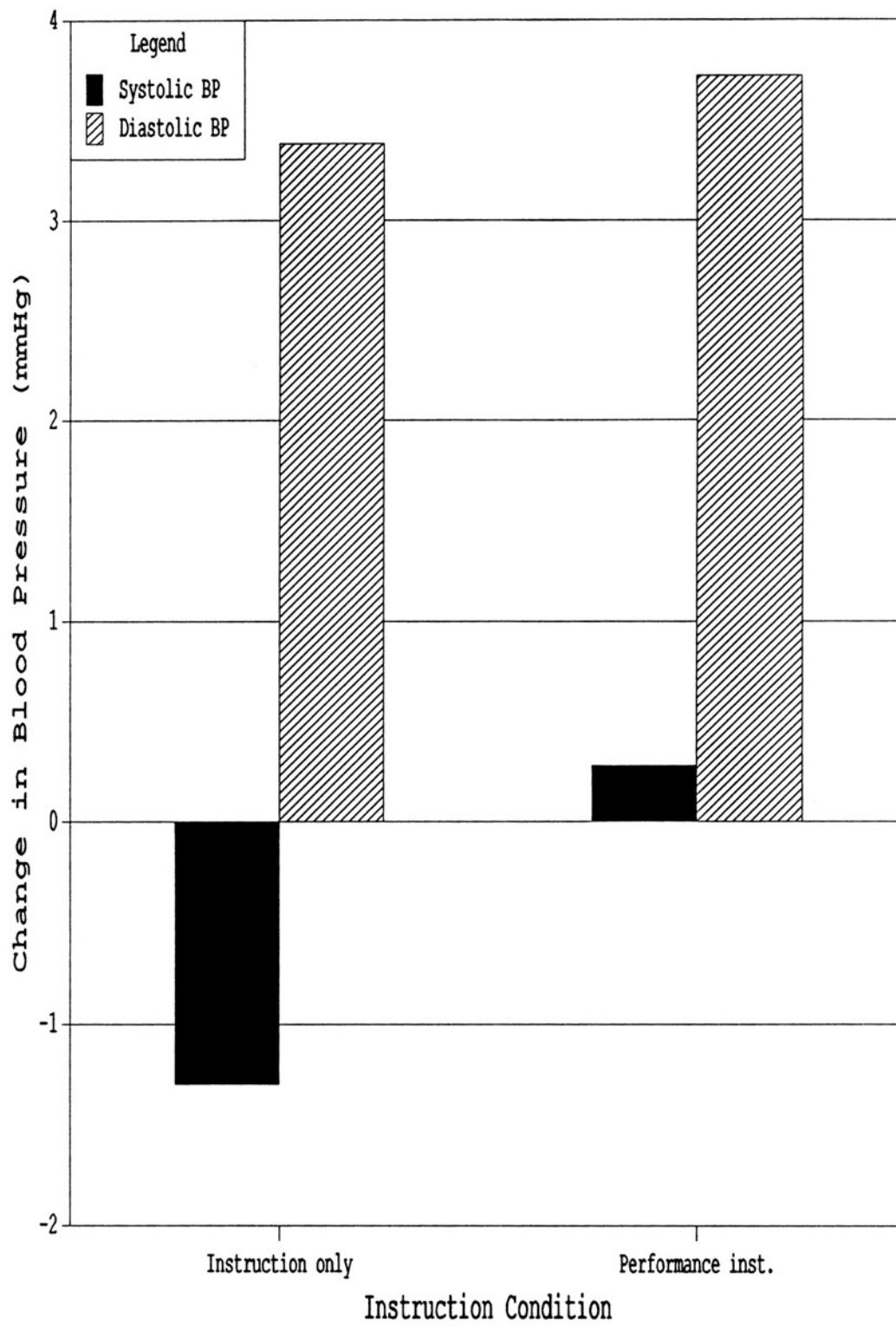


Figure 3

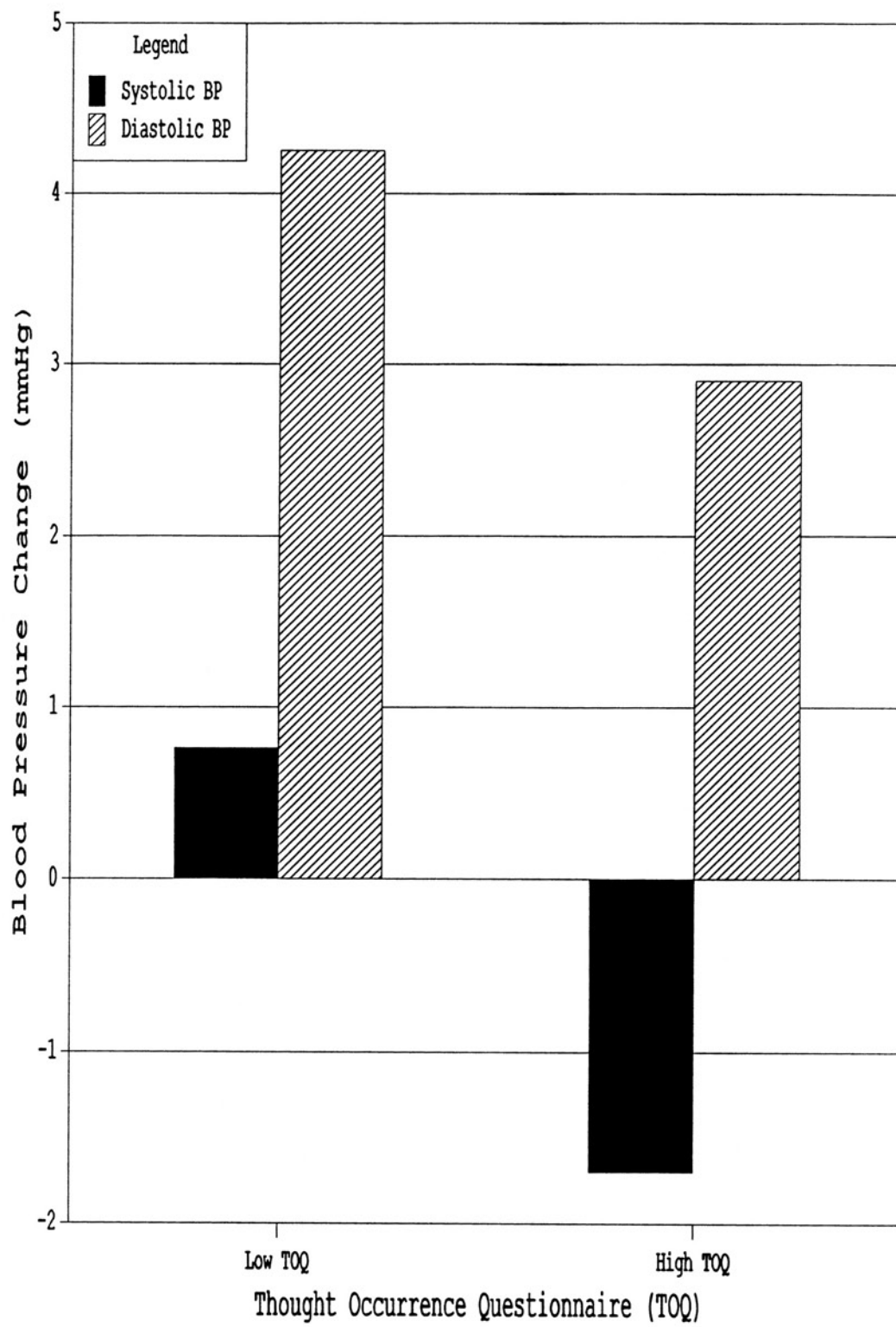


Figure 4

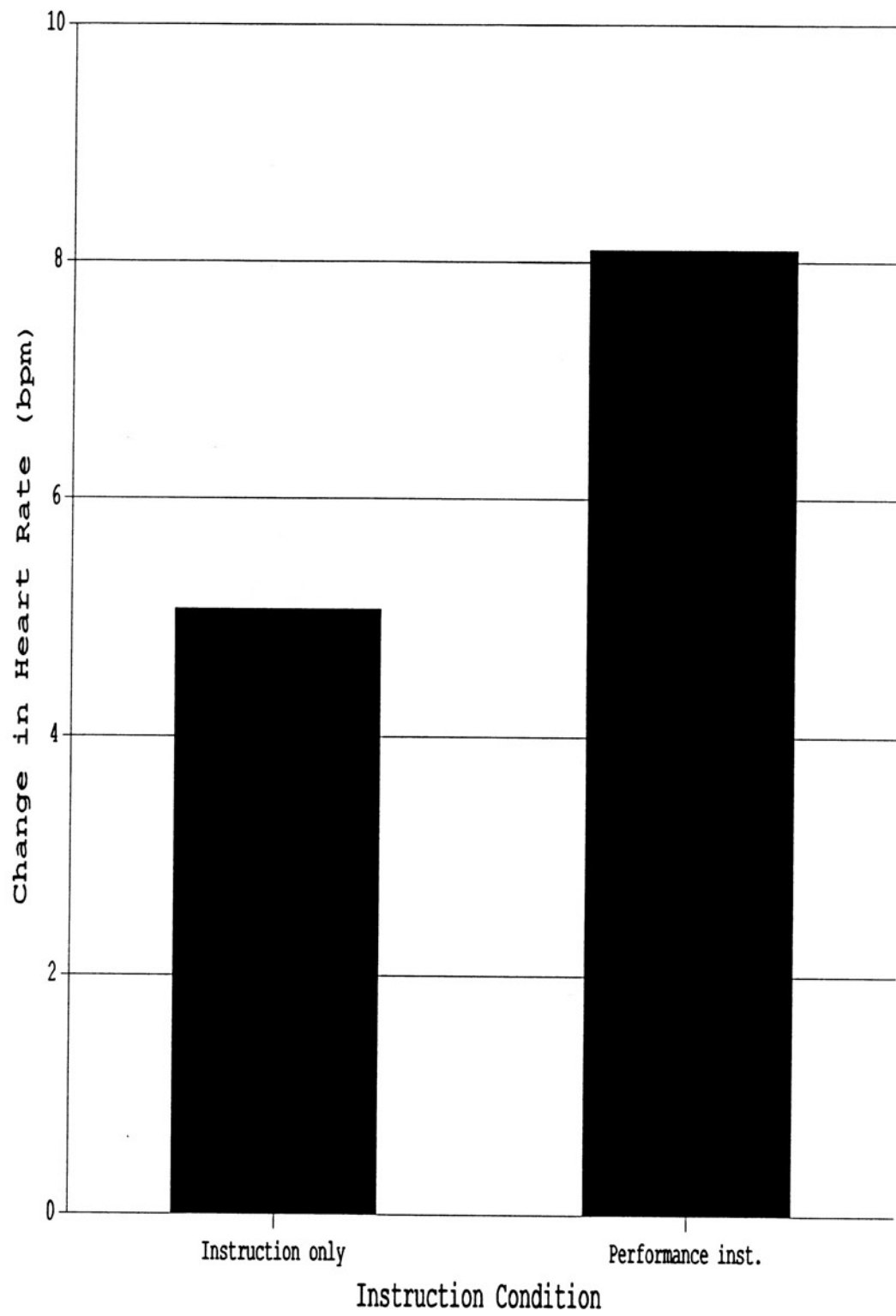


Figure 5

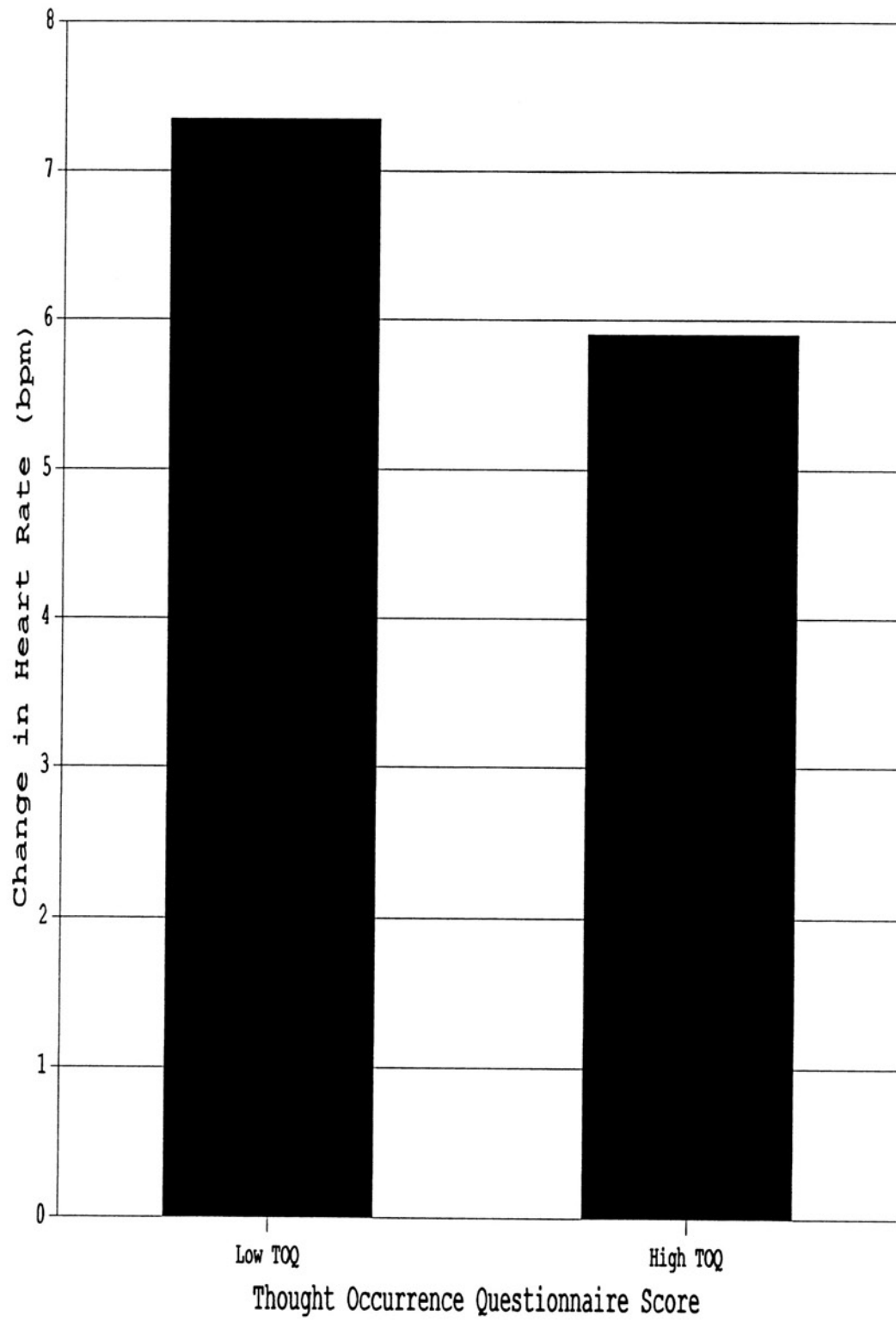


Figure 6



## APPENDIX A



10/14/94 Approval  
Biomedical IRB  
University of Pittsburgh  
Page 1

CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY

TITLE: Intrusive thoughts and reactivity associated with task performance

PRINCIPAL INVESTIGATOR: Karrie J. Craig  
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SPONSORING FACULTY: Andrew Baum, PhD.  
Director, Behavioral Medicine and Oncology  
Pittsburgh Cancer Institute  
University of Pittsburgh  
Pittsburgh, PA 15213  
(412) 624-4800

SOURCE OF SUPPORT: Internal

DESCRIPTION: I have been invited to participate in this study that is evaluating the effects of task performance on several psychological and physiological functions including coping, heart rate, and blood pressure changes. When I arrive at the lab the study will be further explained and I will have a blood pressure cuff placed on my non-dominant arm.

I will be asked to complete a task, during which the blood pressure cuff will self-inflate every 2 minutes to provide readings throughout the task.

---

Participant's Initials

I will also be asked to fill out a variety of questionnaires aimed at determining broad information about background, recent life experiences, health, and overall mood. Following the task I will be asked questions about how the task made me feel.

It is anticipated that 60 people will participate in this study.

RISKS/BENEFITS: Possible inconvenience or discomfort from this study involves possible frustration during the task.

NEW INFORMATION: If any new information, either good or bad, comes to the attention of the investigators which may relate to my willingness to continue to participate, it will be provided to me.

COST AND PAYMENTS: Participation in this study is voluntary. I understand I will be paid \$20 for participation in this study after completion of the 1.5 hour session.

CONFIDENTIALITY: I understand that a record will be kept in a confidential form at the Pittsburgh Cancer Institute. No information by which I can be identified will be released or published. I understand that my research records, like hospital records, may be subpoenaed by court order. My medical records and study records will be reviewed by qualified members of the Pittsburgh Cancer Institute.

RIGHT TO REFUSE/WITHDRAW: I understand that I am free to withdraw my consent to participate in this study at any time. Refusing to participate will involve no penalty or loss of benefits.

COMPENSATION FOR ILLNESS/INJURY: I understand that in the event of a physical injury or illness resulting from this research procedure no monetary compensation will be made, but any immediate emergency medical treatment including hospitalization which may be necessary will be made available to me.

---

Participant's Initials

**VOLUNTARY CONSENT:** I certify that I have read the preceding, or it has been read to me, and I understand its contents. Any questions I have pertaining to the research have been, and will continue to be, answered by Karrie Craig. Any questions I have concerning my rights as a research subject will be answered by the Office of the Senior Vice Chancellor, Health Sciences. A copy of this consent form will be given to me. My signature below means that I have freely agreed to participate in this experimental study.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Signature

I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participating in this research study, have answered any questions that have been raised, and have witnessed the above signature.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Investigator's Signataure

\_\_\_\_\_  
Witness' Signature

8/17/94

Below is a list of words that describe feelings people have. Please read each carefully and circle the number to the left of each word that best describes how you feel NOW.

0 = NOT AT ALL  
 1 = A LITTLE  
 2 = MODERATELY  
 3 = QUITE A BIT  
 4 = EXTREMELY

0	1	2	3	4	Friendly	0	1	2	3	4	Relaxed
0	1	2	3	4	Tense	0	1	2	3	4	Bewildered
0	1	2	3	4	Happy	0	1	2	3	4	Sluggish
0	1	2	3	4	Angry	0	1	2	3	4	Uneasy
0	1	2	3	4	Worn Out	0	1	2	3	4	Kindly
0	1	2	3	4	Unhappy	0	1	2	3	4	Lonely
0	1	2	3	4	Confused	0	1	2	3	4	Miserable
0	1	2	3	4	Lively	0	1	2	3	4	Efficient
0	1	2	3	4	Unable to concentrate	0	1	2	3	4	Bitter
0	1	2	3	4	Sorry for things done	0	1	2	3	4	Pleased
0	1	2	3	4	Shaky	0	1	2	3	4	Alert
0	1	2	3	4	Listless	0	1	2	3	4	Ready to fight
0	1	2	3	4	Overjoyed	0	1	2	3	4	Restless
0	1	2	3	4	Peeved	0	1	2	3	4	Good- natured
0	1	2	3	4	Agreeable	0	1	2	3	4	Gloomy
0	1	2	3	4	Sad	0	1	2	3	4	Desperate

0 = NOT AT ALL  
 1 = A LITTLE  
 2 = MODERATELY  
 3 = QUITE A BIT  
 4 = EXTREMELY

97

0	1	2	3	4	Active	0	1	2	3	4	Rebellious
0	1	2	3	4	On edge	0	1	2	3	4	Nervous
0	1	2	3	4	Grouchy	0	1	2	3	4	Helpless
0	1	2	3	4	Fatigued	0	1	2	3	4	Weary
0	1	2	3	4	Muddled	0	1	2	3	4	Elated
0	1	2	3	4	Blue	0	1	2	3	4	Forgetful
0	1	2	3	4	Energetic	0	1	2	3	4	Deceived
0	1	2	3	4	Spiteful	0	1	2	3	4	Full of pep
0	1	2	3	4	Hopeless	0	1	2	3	4	Warm-hearted
0	1	2	3	4	Satisfied	0	1	2	3	4	Carefree
0	1	2	3	4	Panicky	0	1	2	3	4	Furious
0	1	2	3	4	Helpful	0	1	2	3	4	Uncertain
0	1	2	3	4	Unworthy	0	1	2	3	4	Worthless
0	1	2	3	4	Annoyed	0	1	2	3	4	Anxious
0	1	2	3	4	Cheerful	0	1	2	3	4	Vigorous
0	1	2	3	4	Exhausted	0	1	2	3	4	Terrified
0	1	2	3	4	Resentful	0	1	2	3	4	Good-tempered
0	1	2	3	4	Forgiving	0	1	2	3	4	Guilty
0	1	2	3	4	Discouraged	0	1	2	3	4	Bushed
0	1	2	3	4	Bad-tempered	0	1	2	3	4	Refreshed

Please complete the following questions regarding your background.

\_\_\_\_\_ Age                  \_\_\_\_\_ Height                  \_\_\_\_\_ Weight

\_\_\_\_\_ Gender

\_\_\_\_\_ Ethnic group:

- (1) African American
- (2) Asian
- (3) Hispanic
- (4) White
- (5) Other (specify) \_\_\_\_\_

\_\_\_\_\_ Highest education level:

- (1) Some high school or less
- (2) High school graduate
- (3) Some college or advanced vocational training
- (4) College degree
- (5) Some graduate work
- (6) Graduate degree

\_\_\_\_\_ Current marital status:

- (1) Never married & not now living with a partner
- (2) Married & living together
- (3) Married but living apart
- (4) Married but previously divorced
- (5) Living with a partner
- (6) Widowed
- (7) Divorced

\_\_\_\_\_ Are you currently employed full-time or a full-time student?

\_\_\_\_\_ What is your total FAMILY yearly income?

- (1) under \$10,000
- (2) \$10,001 to \$20,000
- (3) \$20,001 to \$30,000
- (4) \$30,001 to \$40,000
- (5) \$40,001 to \$50,000
- (6) \$50,001 to \$70,000
- (7) \$70,001 to \$90,000
- (8) over \$90,001

\_\_\_\_\_ What is your religious preference?

- (1) Catholic
- (2) Jewish
- (3) Protestant
- (4) Other (specify) \_\_\_\_\_
- (5) Not religious

What is your occupation? \_\_\_\_\_

In the past 24 hours ...

How many caffeinated beverages did you consume? \_\_\_\_\_

How many alcoholic beverages did you consume? \_\_\_\_\_

How many hours of sleep did you get? \_\_\_\_\_



This questionnaire concerns the kinds of thoughts that go through people's heads at particular times, for example, while they are working on a task. The following is a list of thoughts, some of which you might have had while doing the task on which you have just worked. Please indicate approximately how often each thought occurred to you while working on it by placing the appropriate number in the blank provided to the left of each question.

- 1 = Never
- 2 = Once
- 3 = A few times
- 4 = Often
- 5 = Very often

- \_\_\_\_\_ 1. I thought about how poorly I was doing.
- \_\_\_\_\_ 2. I thought about what the experimenter would think of me.
- \_\_\_\_\_ 3. I thought about how I should work more carefully.
- \_\_\_\_\_ 4. I thought about how much time I had left.
- \_\_\_\_\_ 5. I thought about how others have done on this task.
- \_\_\_\_\_ 6. I thought about the difficulty of the problems.
- \_\_\_\_\_ 7. I thought about the level of my ability.
- \_\_\_\_\_ 8. I thought about the purpose of the experiment.
- \_\_\_\_\_ 9. I thought about how I would feel if I were told how I performed.
- \_\_\_\_\_ 10. I thought about how often I got confused.
- \_\_\_\_\_ 11. I thought about other activities (for example, assignments, work).
- \_\_\_\_\_ 12. I thought about members of my family.
- \_\_\_\_\_ 13. I thought about friends.
- \_\_\_\_\_ 14. I thought about something that made me feel guilty.
- \_\_\_\_\_ 15. I thought about personal worried.
- \_\_\_\_\_ 16. I thought about something that made me feel tense.
- \_\_\_\_\_ 17. I thought about something that made me feel angry.
- \_\_\_\_\_ 18. I thought about something that happened earlier today.
- \_\_\_\_\_ 19. I thought about something that happened in the recent past (last few days, but not today).
- \_\_\_\_\_ 20. I thought about something that happened in the distant past.

- \_\_\_\_\_ 21. I thought about something that might happen in the future.
- \_\_\_\_\_ 22. I thought about how difficult it was to concentrate on this task.
23. In general, the thoughts I experienced during the task were (check one):
- \_\_\_\_\_ positive          \_\_\_\_\_ negative

Please circle the number on the following scale which best represents the degree to which you felt your mind wandered during the task you have just completed.

∴

Not at all      1      2      3      4      5      6      7      Very much

Below is a list of words that describe feelings people have. Please read each carefully and circle the number to the left of each word that best describes how you felt DURING THE TASK.

0 = NOT AT ALL  
 1 = A LITTLE  
 2 = MODERATELY  
 3 = QUITE A BIT  
 4 = EXTREMELY

0	1	2	3	4	Friendly	0	1	2	3	4	Relaxed
0	1	2	3	4	Tense	0	1	2	3	4	Bewildered
0	1	2	3	4	Happy	0	1	2	3	4	Sluggish
0	1	2	3	4	Angry	0	1	2	3	4	Uneasy
0	1	2	3	4	Worn Out	0	1	2	3	4	Kindly
0	1	2	3	4	Unhappy	0	1	2	3	4	Lonely
0	1	2	3	4	Confused	0	1	2	3	4	Miserable
0	1	2	3	4	Lively	0	1	2	3	4	Efficient
0	1	2	3	4	Unable to concentrate	0	1	2	3	4	Bitter
0	1	2	3	4	Sorry for things done	0	1	2	3	4	Pleased
0	1	2	3	4	Shaky	0	1	2	3	4	Alert
0	1	2	3	4	Listless	0	1	2	3	4	Ready to fight
0	1	2	3	4	Overjoyed	0	1	2	3	4	Restless
0	1	2	3	4	Peeved	0	1	2	3	4	Good- natured
0	1	2	3	4	Agreeable	0	1	2	3	4	Gloomy
0	1	2	3	4	Sad	0	1	2	3	4	Desperate

0 = NOT AT ALL  
 1 = A LITTLE  
 2 = MODERATELY  
 3 = QUITE A BIT  
 4 = EXTREMELY

0	1	2	3	4	Active	0	1	2	3	4	Rebellious
0	1	2	3	4	On edge	0	1	2	3	4	Nervous
0	1	2	3	4	Grouchy	0	1	2	3	4	Helpless
0	1	2	3	4	Fatigued	0	1	2	3	4	Weary
0	1	2	3	4	Muddled	0	1	2	3	4	Elated
0	1	2	3	4	Blue	0	1	2	3	4	Forgetful
0	1	2	3	4	Energetic	0	1	2	3	4	Deceived
0	1	2	3	4	Spiteful	0	1	2	3	4	Full of pep
0	1	2	3	4	Hopeless	0	1	2	3	4	Warm-hearted
0	1	2	3	4	Satisfied	0	1	2	3	4	Carefree
0	1	2	3	4	Panicky	0	1	2	3	4	Furious
0	1	2	3	4	Helpful	0	1	2	3	4	Uncertain
0	1	2	3	4	Unworthy	0	1	2	3	4	Worthless
0	1	2	3	4	Annoyed	0	1	2	3	4	Anxious
0	1	2	3	4	Cheerful	0	1	2	3	4	Vigorous
0	1	2	3	4	Exhausted	0	1	2	3	4	Terrified
0	1	2	3	4	Resentful	0	1	2	3	4	Good-tempered
0	1	2	3	4	Forgiving	0	1	2	3	4	Guilty
0	1	2	3	4	Discouraged	0	1	2	3	4	Bushed
0	1	2	3	4	Bad-tempered	0	1	2	3	4	Refreshed

## INSTRUCTIONS:

Below is a list of problems and complaints that people sometimes have. Please read each one carefully. After you have done so, please fill in one of the numbered circles to the right that best describes HOW MUCH DISCOMFORT THAT PROBLEM HAS CAUSED YOU DURING THE PAST WEEK INCLUDING TODAY. Mark only one numbered circle for each problem and do not skip any items. If you change your mind, erase your first mark carefully. Read the example below before beginning, and if you have any questions please ask the technician.

SEX

MALE

FEMALE

NAME: \_\_\_\_\_

LOCATION: \_\_\_\_\_

EDUCATION: \_\_\_\_\_

MARITAL STATUS: MAR. \_\_\_\_\_ SEP. \_\_\_\_\_ DIV. \_\_\_\_\_ WID. \_\_\_\_\_ SING. \_\_\_\_\_

DATE

MO DAY YEAR

ID.

NUMBER

AGE

## EXAMPLE

HOW MUCH WERE  
YOU DISTRESSED BY:

NOT AT ALL

A LITTLE BIT

MODERATELY

QUITE A BIT

EXTREMELY

1. Bodyaches

①

②

③

④

VISIT NUMBER: \_\_\_\_\_

HOW MUCH WERE YOU DISTRESSED BY:

NOT AT ALL

A LITTLE BIT

MODERATELY

QUITE A BIT

EXTREMELY

1. Headaches
2. Nervousness or shakiness inside
3. Repeated unpleasant thoughts that won't leave your mind
4. Faintness or dizziness
5. Loss of sexual interest or pleasure
6. Feeling critical of others
7. The idea that someone else can control your thoughts
8. Feeling others are to blame for most of your troubles
9. Trouble remembering things
10. Worried about sloppiness or carelessness
11. Feeling easily annoyed or irritated
12. Pains in heart or chest
13. Feeling afraid in open spaces or on the streets
14. Feeling low in energy or slowed down
15. Thoughts of ending your life
16. Hearing voices that other people do not hear
17. Trembling
18. Feeling that most people cannot be trusted
19. Poor appetite
20. Crying easily
21. Feeling shy or uneasy with the opposite sex
22. Feelings of being trapped or caught
23. Suddenly scared for no reason
24. Temper outbursts that you could not control
25. Feeling afraid to go out of your house alone
26. Blaming yourself for things
27. Pains in lower back
28. Feeling blocked in getting things done
29. Feeling lonely
30. Feeling blue
31. Worrying too much about things
32. Feeling no interest in things
33. Feeling fearful
34. Your feelings being easily hurt
35. Other people being overreactive

1

2

3

4

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HOW MUCH WERE YOU DISTRESSED BY

		NOT AT ALL	SLIGHTLY	MODERATELY	QUITE A BIT	EXTREMELY
36. Feeling others do not understand you or are unsympathetic	36	(0)	(1)	(2)	(3)	(4)
37. Feeling that people are unfriendly or dislike you	37	(0)	(1)	(2)	(3)	(4)
38. Having to do things very slowly to insure correctness	38	(0)	(1)	(2)	(3)	(4)
39. Heart pounding or racing	39	(0)	(1)	(2)	(3)	(4)
40. Nausea or upset stomach	40	(0)	(1)	(2)	(3)	(4)
41. Feeling inferior to others	41	(0)	(1)	(2)	(3)	(4)
42. Soreness of your muscles	42	(0)	(1)	(2)	(3)	(4)
43. Feeling that you are watched or talked about by others	43	(0)	(1)	(2)	(3)	(4)
44. Trouble falling asleep	44	(0)	(1)	(2)	(3)	(4)
45. Having to check and double-check what you do	45	(0)	(1)	(2)	(3)	(4)
46. Difficulty making decisions	46	(0)	(1)	(2)	(3)	(4)
47. Feeling afraid to travel on buses, subways, or trains	47	(0)	(1)	(2)	(3)	(4)
48. Trouble getting your breath	48	(0)	(1)	(2)	(3)	(4)
49. Hot or cold spells	49	(0)	(1)	(2)	(3)	(4)
50. Having to avoid certain things, places, or activities because they frighten you	50	(0)	(1)	(2)	(3)	(4)
51. Your mind going blank	51	(0)	(1)	(2)	(3)	(4)
52. Numbness or tingling in parts of your body	52	(0)	(1)	(2)	(3)	(4)
53. A lump in your throat	53	(0)	(1)	(2)	(3)	(4)
54. Feeling hopeless about the future	54	(0)	(1)	(2)	(3)	(4)
55. Trouble concentrating	55	(0)	(1)	(2)	(3)	(4)
56. Feeling weak in parts of your body	56	(0)	(1)	(2)	(3)	(4)
57. Feeling tense or keyed up	57	(0)	(1)	(2)	(3)	(4)
58. Heavy feelings in your arms or legs	58	(0)	(1)	(2)	(3)	(4)
59. Thoughts of death or dying	59	(0)	(1)	(2)	(3)	(4)
60. Overeating	60	(0)	(1)	(2)	(3)	(4)
61. Feeling uneasy when people are watching or talking about you	61	(0)	(1)	(2)	(3)	(4)
62. Having thoughts that are not your own	62	(0)	(1)	(2)	(3)	(4)
63. Having urges to beat, injure, or harm someone	63	(0)	(1)	(2)	(3)	(4)
64. Awakening in the early morning	64	(0)	(1)	(2)	(3)	(4)
65. Having to repeat the same actions such as touching, counting, or washing	65	(0)	(1)	(2)	(3)	(4)
66. Sleep that is restless or disturbed	66	(0)	(1)	(2)	(3)	(4)
67. Having urges to break or smash things	67	(0)	(1)	(2)	(3)	(4)
68. Having ideas or beliefs that others do not share	68	(0)	(1)	(2)	(3)	(4)
69. Feeling very self-conscious with others	69	(0)	(1)	(2)	(3)	(4)
70. Feeling uneasy in crowds, such as shopping or at a movie	70	(0)	(1)	(2)	(3)	(4)
71. Feeling everything is an effort	71	(0)	(1)	(2)	(3)	(4)
72. Spells of terror or panic	72	(0)	(1)	(2)	(3)	(4)
73. Feeling uncomfortable about eating or drinking in public	73	(0)	(1)	(2)	(3)	(4)
74. Getting into frequent arguments	74	(0)	(1)	(2)	(3)	(4)
75. Feeling nervous when you are left alone	75	(0)	(1)	(2)	(3)	(4)
76. Others not giving you proper credit for your achievements	76	(0)	(1)	(2)	(3)	(4)
77. Feeling lonely even when you are with people	77	(0)	(1)	(2)	(3)	(4)
78. Feeling so restless you couldn't sit still	78	(0)	(1)	(2)	(3)	(4)
79. Feelings of worthlessness	79	(0)	(1)	(2)	(3)	(4)
80. The feeling that something bad is going to happen to you	80	(0)	(1)	(2)	(3)	(4)
81. Shouting or throwing things	81	(0)	(1)	(2)	(3)	(4)
82. Feeling afraid you will faint in public	82	(0)	(1)	(2)	(3)	(4)
83. Feeling that people will take advantage of you if you let them	83	(0)	(1)	(2)	(3)	(4)
84. Having thoughts about sex that bother you a lot	84	(0)	(1)	(2)	(3)	(4)
85. The idea that you should be punished for your sins	85	(0)	(1)	(2)	(3)	(4)
86. Thoughts and images of a frightening person	86	(0)	(1)	(2)	(3)	(4)
87. The idea that something serious is wrong with you	87	(0)	(1)	(2)	(3)	(4)
88. Never feeling close to anybody	88	(0)	(1)	(2)	(3)	(4)
89. Feelings of guilt	89	(0)	(1)	(2)	(3)	(4)

**For each event listed below, please indicate whether you have experienced it, if it happened more than once, and how long ago the most recent occurrence happened.**

			How many times?	When was the most recent time? (in yrs.)
1. Did anyone ever take something from you by force or threat of force, such as in a robbery, mugging, or hold up?	Yes	No	_____	_____
2. Did anyone ever beat you up or attack you?	Yes	No	_____	_____
3. Did anyone ever make you have sex by using force or threatening to harm you? This includes any type of unwanted sexual activity.	Yes	No	_____	_____
4. Did a close friend or family member ever die because of an accident, homicide, or suicide?	Yes	No	_____	_____

			How many times?	When was the most recent time? (in yrs.)
5. Did you ever suffer injury or property damage because of fire?	Yes	No	_____	_____
6. Did you ever suffer injury or property damage because of severe weather or either a natural or humanmade disaster?	Yes	No	_____	_____
7. Were you ever in a motor vehicle accident serious enough to cause injury to one or more people?	Yes	No	_____	_____
8. Did you ever have some other terrifying or shocking experience that is not covered above? Please describe briefly what happened.	Yes	No	_____	_____
_____				
_____				
_____				
_____				



This questionnaire concerns the kind of thoughts that go through people's heads when they have to concentrate on something, such as working, reading directions, or reading a book. The following is a list of thoughts, which, in your past experience, you may have had while working on various types of tasks. Please estimate how often each thought has occurred to you by placing the appropriate letter to the left of each item.

A = Never  
 B = Once  
 C = A few times  
 D = Often  
 E = Very often

- \_\_\_\_\_ 1. I think about how poorly I am doing.
- \_\_\_\_\_ 2. I think about what someone will think of me.
- \_\_\_\_\_ 3. I think about how I should be more careful.
- \_\_\_\_\_ 4. I think about how well others can do on what I am trying to do.
- \_\_\_\_\_ 5. I think about how difficult what I am doing is.
- \_\_\_\_\_ 6. I think about my level of ability.
- \_\_\_\_\_ 7. I think about the purpose of what I am doing.
- \_\_\_\_\_ 8. I think about how I would feel if I were told how I performed.
- \_\_\_\_\_ 9. I think about how often I get confused.
- \_\_\_\_\_ 10. I think about other activities (for example, assignments, work).
- \_\_\_\_\_ 11. I think about members of my family.
- \_\_\_\_\_ 12. I think about friends.
- \_\_\_\_\_ 13. I think about something that makes me feel guilty.
- \_\_\_\_\_ 14. I think about personal worries.
- \_\_\_\_\_ 15. I think about something that makes me feel tense.
- \_\_\_\_\_ 16. I think about something that makes me feel angry.
- \_\_\_\_\_ 17. I think about something that happened earlier in the day.
- \_\_\_\_\_ 18. I think about something that happened in the recent past (for example, in the last few days).
- \_\_\_\_\_ 19. I think about something that happened in the distant past.
- \_\_\_\_\_ 20. I think about something that might happen in the future.
- \_\_\_\_\_ 21. I think about stopping.

- \_\_\_\_\_ 22. I think about how unhappy I am.
- \_\_\_\_\_ 23. I think about how hard it is.
- \_\_\_\_\_ 24. I think about how I can't stand it anymore.
- \_\_\_\_\_ 25. I think about quitting.
- \_\_\_\_\_ 26. I think about running away.
- \_\_\_\_\_ 27. I think about taking something (e.g, pills, a drink) to  
make it easier.
- \_\_\_\_\_ 28. I think about going to bed/or to sleep.
- \_\_\_\_\_ 29. I think about how difficult it is to concentrate on what  
I am doing.
30. 'In general, the thoughts I have while working or  
concentrating on something are (check one):
- \_\_\_\_\_ positive          \_\_\_\_\_ negative

# RECENT LIFE CHANGES QUESTIONNAIRE

To answer the questions below, mark an "X" in the column to the right of each event that occurred to you within the past six months. If the event has not occurred to you during the past six months leave all of the columns empty.

The column marked "Your Adjustment Score" will be explained at the end of the questionnaire.

Within the last six months, have you experienced:	0-6 mos. ago	Your Adjustment Score
<b>A. HEALTH</b>		
1. An illness or injury which: (a) kept you in bed a week or more, or took you to the hospital?		
(b) was less serious than described above?		
2. A major change in eating habits?		
3. A major change in sleeping habits?		
4. A change in your usual type and/or amount of recreation?		
5. Major dental work?		
<b>B. WORK</b> During the past six months, have you:		
6. Changed to a new type of work?		
7. Changed your work hours or conditions?		
8. Had a change in your responsibilities at work? (a) more responsibilities?		
(b) less responsibilities?		
(c) promotion?		
(d) demotion?		
(e) transfer?		
9. Experienced troubles at work?		
10. Experienced a major business readjustment?		

11. Retired?		
12. Experienced being: (a) fired from work?		
(b) laid off from work?		
13. Taken courses by mail or studied at home to help you in your work?		
C. HOME AND FAMILY During the past six months, have you experienced:		
14. A change in residence: (a) a move within the same town or city?		
(b) a move to a different town, city, or state?		
15. A change in family "get-togethers"?		
16. A major change in the health or behavior of a family member (illnesses, accidents, drug or disciplinary problems, etc.)?		
17. The death of a spouse?		
18. The death of a: (a) child?		
(b) brother or sister?		
(c) parent?		
(d) other close family member?		
19. The death of a close friend?		
20. A change in the marital status of your parents?		
NOTE: Questions 21-32 concern marriage. For persons never married, go to item 33.		
21. Marriage?		
22. A change in arguments with your spouse?		
23. In-law problems?		
24. A separation from spouse: (a) due to work?		
(b) due to marital problems?		

25. A reconciliation with spouse?		
26. A divorce?		
27. A gain of a new family member: (a) birth of a child?		
(b) adoption of a child?		
(c) a relative moving in with you?		
28. Spouse beginning or ceasing work outside the home?		
29. Self (or wife) becoming pregnant?		
30. A child leaving home: (a) due to marriage?		
(b) to attend college?		
(c) for other reasons?		
31. Self (or wife) having an miscarriage or abortion?		
32. Birth of a grandchild?		
D. PERSONAL AND SOCIAL During the past six months, have you experienced:		
33. A major personal achievement?		
34. A change in your personal habits (your dress, friends, life-style, etc.)?		
35. Sexual difficulties?		
36. Beginning or ceasing school or college?		
37. A change of school or college?		
38. A vacation?		
39. A change in your religious beliefs?		
40. A change in your social activities (clubs, movies, visiting)?		
41. A minor violation of the law?		
42. Legal troubles resulting in your being held in jail?		
43. A change in your political beliefs?		
44. A new, close, personal relationship?		

45. An engagement to marry?		
46. A "falling out" of a close personal relationship?		
47. Boyfriend/girlfriend problems?		
48. A loss or damage of personal property?		
49. An accident?		
50. A major decision regarding your immediate future?		
E. FINANCIAL During the past six months, have you:		
51. Taken on a moderate purchase, such as a T.V., car or freezer?		
52. Taken on a major purchase or a mortgage loan, such as a home, business, or property?		
53. Experienced a foreclosure on a mortgage or loan?		
54. Experienced a major change in finances:		
(a) increased income?		
(b) decreased income?		
(c) credit rating difficulties?		

#### INSTRUCTIONS FOR YOUR ADJUSTMENT SCORE

Persons adapt to their recent life changes in different ways. Some people find the adjustment to a residential move, for example, to be enormous, while others find very little life adjustment necessary. You are now requested to "score" each of the recent life changes that you marked with an "X" as to the amount of adjustment you needed to handle the event.

Your scores can range from 1 to 100 with "1" representing no life adjustment at all and "100" representing maximum life adjustment. For intermediate life adjustment scores you would choose a number between 1 and 100.

Please go back to the items that you marked as having occurred in the past six months and give each marked event a life adjustment score.

Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you DURING THE PAST SEVEN DAYS. If they did not occur during that time, please mark the "not at all" column.

Please think of the following event while filling out the questionnaire.

On \_\_\_\_\_ you experienced \_\_\_\_\_.

Frequency

	not at all	rarely	sometimes	often
1. I thought about it when I didn't mean to.				
2. I avoided letting myself get upset when I thought about it or was reminded of it.				
3. I tried to remove it from my memory.				
4. I had trouble falling asleep or staying asleep.				
5. I had waves of strong feelings about it.				
6. I had dreams about it.				
7. I felt as if it hadn't happened or wasn't real.				
8. I tried not to talk about it.				
9. Pictures about it popped into my mind.				
10. I stayed away from reminders of it.				
11. Other things kept making me think about it.				
12. I was aware that I still had a lot of feelings about it, but didn't deal with them.				
13. I tried not to think about it.				
14. Any reminder brought back feelings about it.				
15. My feelings about it were kind of numb.				

**INSTRUCTIONS:**

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, what time have you usually gone to bed at night?

BED TIME: \_\_\_\_\_

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES: \_\_\_\_\_

3. During the past month, what time have you usually gotten up in the morning?

GETTING UP TIME: \_\_\_\_\_

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed).

HOURS OF SLEEP PER NIGHT: \_\_\_\_\_

For each of the remaining questions, check the one best response. Please answer all questions.

During the past month, how often have you had trouble sleeping because you...

- a) Cannot get to sleep within 30 minutes

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- b) Wake up in the middle of the night or early morning

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- c) Have to get up to use the bathroom

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- d) Cannot breathe comfortably

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- e) Cough or snore loudly

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

- f) Feel too cold

Not during the past month _____	Less than once a week _____	Once or twice a week _____	Three or more times a week _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------



## g) Feel too hot

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## h) Had bad dreams

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## i) Have pain

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## j) Other reason(s), please describe \_\_\_\_\_

How often during the past month have you had trouble sleeping because of this?

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## 6. During the past month, how would you rate your sleep quality overall?

Very good \_\_\_\_\_

Fairly good \_\_\_\_\_

Fairly Bad \_\_\_\_\_

Very Bad \_\_\_\_\_

## 7. During the past month, how often have you taken medication (prescribed or "over the counter") to help you sleep?

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## 8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the  
past month \_\_\_\_\_Less than  
once a week \_\_\_\_\_Once or twice  
a week \_\_\_\_\_Three or more  
times a week \_\_\_\_\_

## 9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all \_\_\_\_\_

Only a very slight problem \_\_\_\_\_

Somewhat of a problem \_\_\_\_\_

A very big problem \_\_\_\_\_

## APPENDIX B

On the next page you will see a series of disarranged words. Your job will be to rearrange each group of letters so that they make a meaningful English word. Start when you are instructed. Stop at the stop signal.

1. ETLHHA \_\_\_\_\_
2. ETROS \_\_\_\_\_
3. RECM I \_\_\_\_\_
4. CNEGAH \_\_\_\_\_
5. NMGOINR \_\_\_\_\_
6. NSRWAE \_\_\_\_\_
7. SPRUUE \_\_\_\_\_
8. SUTCBII \_\_\_\_\_
9. SCLIAO \_\_\_\_\_
10. EVSUORN \_\_\_\_\_
11. RSANEO \_\_\_\_\_
12. IMTCELA \_\_\_\_\_
13. ELSAUX \_\_\_\_\_

On the next page, you will see a series of disarranged words. Your job will be to rearrange each group of letters to make a meaningful English word. Start when you are instructed. Stop at the stop signal.

Ability to organize material such as the letters on the next page has been found to be directly related to intelligence level. High school students of above average intelligence (IQ greater than 100) and most college students should be able to successfully complete the task.

1. ETLHHA \_\_\_\_\_
2. ETROS \_\_\_\_\_
3. RECM I \_\_\_\_\_
4. CNEGAH \_\_\_\_\_
5. NMGOINR \_\_\_\_\_
6. NSRWAE \_\_\_\_\_
7. SPRUUE \_\_\_\_\_
8. SUTCBII \_\_\_\_\_
9. SCLIAO \_\_\_\_\_
10. EVSUORN \_\_\_\_\_
11. RSANEO \_\_\_\_\_
12. IMTCELA \_\_\_\_\_
13. ELSAUX \_\_\_\_\_

## Anagram Solutions

HEALTH  
STORE  
CRIME  
CHANGE  
MORNING  
ANSWER  
PURSUE  
BISCUIT  
SOCIAL  
NERVOUS  
REASON  
CLIMATE  
SEXUAL

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